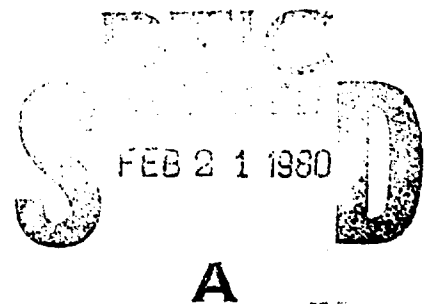**HumRRO** **LEVEL** I

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HUMAN RESOURCES RESEARCH ORGANIZATION

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Final Report

SPECIFYING AND MEASURING
UNIT PERFORMANCE OBJECTIVES

John A. Boldovici
Ronald E. Kraemer

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This is one volume of a two-volume Final Report. The other volume is, "Critical Incidents as Reported by Veterans of Armored Combat," by John A. Boldovici, et al. Research performed under Work Unit PRETAC.

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This is one volume of a two-volume report on work to identify and begin solving problems associated with specifying and measuring unit (team) performance objectives. This volume outlines difficulties writers encounter in specifying performance objectives, describes a study of critical incidents, and compares the critical incidents with existing task lists. A final section compares HumRRO and ARTEP task descriptions, presents rationales for research to improve the reliability of unit performance measurement, and describes relevant work that was initiated during this project.

THIS IS ONE VOLUME OF A TWO-VOLUME FINAL REPORT. THE OTHER
VOLUME IS:

Boldovici, J.A., Kraemer, R.E., Reeves, J.R., and Healy, R.E.,
<u>Critical Incidents as Reported by Veterans of Armored Combat</u>.
Fort Knox, Kentucky: Human Resources Research Organization,
1975.

FOREWORD

This is one volume of a two-volume final report for a project
to identify and begin solving problems associated with specifying
and measuring unit (team) performance objectives. This volume
describes the work performed during the project, and suggests
directions for research on measuring unit performance. The other
volume (Boldovici, et al., 1975) contains narratives of critical
incidents with veterans of armored combat.

The work reported in this volume was conducted by the Human
Resources Research Organization at Fort Knox, Kentucky, under
Contract No. DAHC 19-73-C-0004, with the U.S. Army Research
Institute for the Behavioral and Social Sciences (ARI).

The project was directed and the report written by John A.
Boldovici, with assistance from Ronald E. Kraemer.

Angelo Mirabella, the Contracting Officer's Technical
Representative, and his colleagues, G. Gary Boycan and Eugene
Johnson, provided administrative assistance, valuable criticism,
and substantive suggestions for conceptualizing problems and
solutions throughout the project.

The part of the study that involved collecting critical
incidents with veterans of armored combat could not have been
performed without the cooperation of many people. LTC Willis G.
Pratt, ARI Field Unit Military Chief, helped recruit and schedule
subjects at Fort Knox. Mr. George G. Gividen, ARI Field Unit
Technical Chief, coordinated subject-scheduling and recruiting at
Fort Hood. The enlisted men, NCOs, and officers who supplied
the critical incidents were, as usual, gracious and cooperative.

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SUMMARY

Recognizing a need for improved methods for describing and measuring unit (team) performance, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) initiated research to identify and begin solving problems associated with specifying and measuring unit performance objectives.

The objective-writer will encounter several problems that are unique to each part of a unit performance objective -- problems in specifying the conditions under which task performance is to occur, problems in specifying job tasks and training content, and problems in specifying performance standards.

The main problems to be solved in writing the conditions parts of unit objectives will be:

1. Selecting from the entire range of conditions that might affect job performance, a set or sets of conditions for inclusion in the objectives.

2. Selecting levels for the conditions that will be included in the objective.

In specifying unit job tasks or activities, the main problem to be solved is how to ensure that the task or activity "pool" is comprehensive; that is, making sure that no important job tasks, skills, or knowledge has been omitted from the pool.

If the writer of unit job objectives also will be involved in writing unit training objectives, he will next encounter problems in deciding which objectives, tasks, skills, and knowledge to include in training, and which to exclude.

Finally, the objective-writer may find that the information he needs for setting performance standards is unavailable; for example, information on the capabilities of prospective opponents, which is necessary for setting standards for combat performance.

The usual method of solving the problems noted above is by reliance on expert opinion. Inasmuch as errors in specifying combat performance requirements could have disastrous consequences, and inasmuch as expert opinion may be unreliable, invalid, or both, supplements and alternatives to expert opinion were suggested for specifying unit performance objectives.

Difficulties also will be encountered in trying to use systems-engineering or traditional task-descriptive approaches in specifying unit performance objectives -- and especially in using these approaches for defining objectives for combat performance. This is so because traditional methods for specifying job objectives require that the conditions under which performance is to be demonstrated be explicitly stated. In combat, and for other gaming performance, these conditions not only will vary widely and frequently, but also will be altered deliberately for the express purpose of degrading opponents' performance. This applies equally to combat performance for individuals and for units. But the problems will be even greater in specifying objectives for units than in specifying objectives for individuals; because effective team performance requires responding, not only to conditions that will be deliberately made to appear unpredictable by opponents, but also to stimulus conditions that will be generated by other team members.

Of the problems associated with specifying and measuring unit performance objectives, two were chosen for attention in this project. The first of these problems was the one mentioned earlier: unnecessary reliance on expert opinion in specifying job and training content. The second problem that was addressed was unreliability in measuring unit performance.

To address the first problem, a small-scale critical incident study was undertaken with veterans of armored combat, for the purpose of comparing the results with task descriptions that were generated during an earlier project (O'Brien, et al., 1974). The impetus for the study was the suspicion that existing task data, generated on an "armchair" basis, may not reflect actual performance of job tasks in combat.

Of the 236 critical incidents obtained during the study, about a fifth could not be matched with any task or duty in the existing task descriptions, indicating that the existing descriptions were not comprehensive; that is, some combat job tasks did not appear in the original descriptions. The omitted tasks pertained, for the most part, to "safety" and to creating new solutions for combat problems.

A content analysis of the critical incidents also was performed. The content category containing the largest number of incidents was "quick, decisive action."

The suggestion was made that, if one's goal is to generate a performance-requirement data base for combat jobs that is both comprehensive and detailed, then both task analysis and the Critical Incident Technique should be used. Task analysis will

yield the detailed descriptions of behavior from which instructional design and evaluation can proceed. And critical incidents can be used to check the comprehensiveness of the task descriptions, for identifying "higher-order" behavior, and as aids in generating realistic scenarios for use in training and evaluation.

The second problem (unreliability in measuring unit performance) was addressed by identifying variables that might affect reliability in each of three "phases" of measurement: (1) observer preparation, (2) observation, and (3) recording and reporting. Possible effects of these variables on ARTEP measurement were suggested, as was a paradigm for the conduct of research to improve ARTEP measurement reliability.

Conducting research to improve the reliability of unit performance measurement requires that whatever is to be observed and measured (e.g., simulated combat):

1. "Sit still" long enough to permit observers to make the required measures.

2. Be presented uniformly or varied systematically for various groups of observers.

These requirements can be met by the use of photography.

An animated motion picture of a tank platoon advancing to contact was produced during the project, for use by ARI in research to improve measurement reliability. The results of research using the motion picture as suggested in the report would lead immediately to action recommendations for improving measurement reliability, and could be incorporated directly into forthcoming ARTEP revisions -- or for that matter, into any program for measuring unit performance.

CONTENTS

INTRODUCTION

The U.S. Army and other military services conduct two kinds of training and evaluation -- individual or "basic" training and evaluation, and unit or team training and evaluation. Techniques for conducting individual training and evaluation have been documented frequently. Routines for training development can be found not only in text books (e.g., Smith, 1971), but also in several handbooks (e.g., Gropper and Short, 1968; Briggs, 1970; Schumacher and Glasgow, 1974). The degree to which training development procedures have been routinized is exemplified in the term, "instructional technology." The implication seems to be that, just as civil engineers who "know their business" can design and supervise the construction of fail-safe bridges, training developers who "know their business" can design and construct fail-safe training and evaluation programs. Agreement with the opinions of Klaus (1969) and others (e.g., Schwarz and Boldovici, 1971) is increasing; namely, that training development technology has evolved to the point where the top-priority need is no longer for additional research on methods of instruction, but simply for applying what is already known to the development of instructional and evaluation programs.

Task-analytic and systems-engineering approaches have indeed provided the means for producing training and evaluation systems that are more efficient than systems based on earlier "armchair" and trial-and-error approaches. And inasmuch as modern instructional technologists agree that certain operations are necessary for designing efficient training and evaluation systems, one might say that a technology of sorts has emerged. But even in the design of training and evaluation programs for individuals, the instructional technologist finds deficiencies in the tools of his trade:

"The past two years have been bad ones for those of us
who attempt to apply traditional principles of learning
to instruction.... As we have seen:

"1. Knowledge of results is not necessary for learning.
"2. Delayed knowledge of results may be more effective
     than immediate knowledge of results.
"3. Rewards seem not always to function to improve
     learning, and the effect depends upon the type
     of reward.
"4. Errors do not seem to persist as expected.
"5. Careful planning of a learning program may be no
     better than a random sequence.
"6. Learning by a sequence of small steps may be less
     effective than learning by larger jumps.
"7. Defining objectives may not help improve student
     learning." (McKeachie, 1974).

One reason that training and evaluation development is a less
precise technology than, say, civil engineering, is because of the
absence of information on cause-effect relations. Modern instruc-
tional technologists may indeed be fairly successful in designing
programs that work better than their predecessors. But the new
approaches are basically "shotgun." The use of self-pacing,
individualization, knowledge of results, and differential reinforce-
ment for correct and incorrect responding usually will result in
programs that are more effective than programs in which these
characteristics have been ignored. But the amount of profi-
ciency or learning improvement attributable to each program
characteristic usually is not known.

Another limitation of modern methods for instructional design
is that they seem better suited for developing programs to
teach routine, proceduralized behavior than for "higher order"
behavior. The new approaches seem not, for example, to have
improved our ability to design training for gaming performance,
including training for combat. We know of no performance contracts,

for example, in which a 90/90 criterion is guaranteed in teaching hand-to-hand combat. The problem here is that systems-engineering approaches assume that the number and kinds of conditions under which performance is to be demonstrated are, in some sense of the word, manageable: conditions must be explicitly stated as part of any job or training objective. In combat, and for other gaming behavior, conditions not only vary widely and frequently, but also are deliberately altered by one party for the express purpose of degrading his opponent's performance. Applying systems-engineering approaches to teaching and evaluating gaming behavior is, therefore, more difficult than applying these approaches to behavior in which conditions are stable.

The problems noted above apply to developing and evaluating training for individuals. In training and evaluating combat units or teams, the problems are even greater. This is so because, in addition to having to respond to conditions that are deliberately altered by the enemy, effective team performance requires team members to respond to a large number of widely varying and frequently unpredictable stimulus conditions that are generated by other team members.

The Army has, of course, been involved in training and evaluating units for a long time. Until recently, units were trained in accordance with Army Training Programs (ATP), and evaluated using Army Training Tests (ATT), or Operational Readiness Training Tests (ORTT) for active units. These programs and tests had several deficiencies. Training development methods were not flexible enough to permit developing programs that responded to different training needs of various units, or to fluctuations in training demands and resources

over time. The testing procedures were largely subjective, and yielded evaluation results that were too gross to be diagnostically useful.

In an effort to improve Army training and testing programs, the Army Chief of Staff in January 1971 directed that responsibility for training and evaluation be decentralized. Battalion and company commanders were charged with determining training needs locally, and with implementing programs to meet these needs. Procedures comprising a program of systems engineering for unit training were documented in CONARC Pamphlet 350-11. These procedures were to be used by the unit commanders for meeting their training and evaluation responsibilities.

The emphasis on systems engineering for unit training also provided the impetus for developing a series of Army Training and Evaluation Programs (ARTEP). The ARTEPs are based on mission analysis, and contain explicit statements of training objectives that are expressed "...in terms of unit performance, that specifies what a unit element is expected to be able to do at the end of training. [A training objective] consists of an action, a condition, and a standard."

The CONARC pamphlet and the ARTEPs represent attempts to apply what is known about developing training and evaluation systems for individuals to the design of training and evaluation programs for units. Problems remain. Users complain about difficulties in applying the concepts presented in the CONARC pamphlet (just as users complain about difficulties in applying the procedures presented in handbooks for individual training development). And ARTEP measurement still is very subjective.

Given the necessity for effective unit performance for success in combat, and the problems associated with designing and evaluating unit instruction, the need for pushing forward the development of a technology of unit performance is evident. A question naturally arises: Are the techniques for developing and evaluating training for individual performance applicable to unit performance? Answering this question has been the subject of several projects sponsored by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI).

One of the ARI-sponsored projects (O'Brien, et al., 1974), conducted by the Human Resources Research Organization (HumRRO), applied traditional task-descriptive methods to developing a pool of job objectives for armor crews, platoons, and companies. While the project produced job-task lists for the armor units, several problems were encountered. Difficulties were encountered in specifying the conditions under which the tasks were to be performed. And because the full range of conditions for task performance could not be predicted, exact time and quality standards could not be specified.

The present study was a continuation of the project cited above. The new project had two purposes:

1. Document a set of procedures for use in developing a performance-requirement data base (i.e., pool of job objectives) for units.

2. Isolate problems in applying the procedures.

Performance Requirement Data Base:
General Considerations

There are no universally accepted definitions of "performance-requirement data base." And understanding of the need for a performance-requirement data base does not seem widespread. We will therefore define the term and try to justify the need.

A performance-requirement data base is a comprehensive set of job objectives. The word "comprehensive" is important. It means all-inclusive or without omission. When an objective-writer says, "I've developed a comprehensive set of job objectives," he means that his objectives describe the full range of tasks that are encompassed by the job. No job objectives have been omitted from his set.

Job objectives are one class of human performance objectives, which are characterized by three parts:

1. Activity or task statement.
2. Conditions statement.
3. Standards statement.

Activities or Tasks

Activities or tasks are brief statements, usually consisting of an active verb and a direct object, of the behavior addressed by the objective. "Neutralize targets" is a task or activity statement for tank crews.

Conditions

Conditions refer to any circumstances that might be expected to alter the quality or the productivity of the task or activity that is to be performed. Conditions include characteristics of

the environment, the object being acted upon, and tools used to perform a task. Examples of conditions for the tank crew activity "neutralize targets" are day and night, caliber .50 and coaxial machineguns, and stationary and moving firing vehicles and targets.

Standards

Standards, as used in human performance objectives, describe the quality or the amount (quantity, production) of the performance of interest, or both. Performance quality in gunnery, for example, is expressed as accuracy, and production as number of hits. As in all standards, quantity and quality measures of human performance have little utility alone. To be useful, the quantity and quality measures must be expressed relative to cost: how much does it cost to obtain given levels of quality or quantity of performance? In human performance objectives, indirect measures of cost usually are used. Time and amount of material expended are examples of human performance "costs."

A standard for a tank crew might be, "score a second-round hit within seven seconds." In this standard the measure of:

1. Quality is "hit" (as opposed to "miss").
2. Quantity is one hit, the measure of production implied in the standard.
3. Cost is seven seconds and two rounds.

Human performance standards frequently are stated imprecisely. One often finds, for example, standards stated as "90 percent hit rate," or "five rounds per minute." Standards should include separate measures of quality, quantity, and cost, for several reasons:

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1. Clarity of communication to test designers, test administrators, and others. "Ninety percent hit rate," and "five rounds per minute" are incomplete standards, in that they have no cost measures associated with them. "Ninety percent hit rate" does not communicate the number of rounds to be expended. And "five rounds per minute" does not communicate the total amount of time that will be allowed for achieving the five-per-minute criterion.

2. The possibilities for statistical inference with respect to performance reliability and confidence levels are quite different for, say, 9 out of 10 hits as opposed to 90 out of 100 hits.

3. To permit various combinations of basic data for analysis of standards by interested investigators.

Pools of job objectives may be generated in several ways. Task analysis is perhaps the best known. Behavior is described at successively greater levels of detail, beginning with a simple enumeration of task "areas" and ending with exhaustive descriptions of behavior in terms of "task elements."

Another method for generating descriptions of job-relevant behavior is the Critical Incident Technique (Flanagan, 1954). Records of extremely effective and extremely ineffective job-related behavior are generated on the basis of interviews with incumbents, supervisors, peers of incumbents, or any other group whose judgments of "effective" and "ineffective" are credible.

Finally, there is the method (not yet named, to the best of our knowledge) that was used in a recent project (Kraemer and Boldovici, 1975) to define job requirements for tank gunnery. After deciding on an overall statement of the job "task" or

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objective -- "neutralize targets," for tank gunnery -- all condi-
tions that are likely to affect task performance were identified.
All possible combinations of the conditions were then examined,
in order to identify all possible ways that the job "task" could
be performed.

The methods cited above have been developed and tried
out in the individual context. Their applicability to team
tactical situations needs to be explored. The goal of these
methods is to form a comprehensive data base of job-relevant
behavior. The behavior comprising the data base can be thought
of as a pool or domain of all possible job objectives. Objectives
for training or items for evaluation can be selected or derived
from the domain. Without a pool or domain against which to compare
training or evaluation content, it is impossible to determine what
has been "left out" of training or evaluation. Another way of
viewing the concept is that training programs and evaluation
programs require sampling of the behaviors encompassed by the
job. The pool or data base generated by the methods described
above defines the population of job behavior from which samples
of behavior are taken for inclusion in training or tests. Without
the pool or data base, we have no way of knowing which "chunks" of
the job are not being addressed in training or testing, and there-
fore, no basis other than opinion for judging the comprehensiveness
of training or test content.

Directions and Purposes

A handbook of procedures for specifying unit job objectives
was initially envisioned as the main outcome of the project. As
a first step in documenting a set of procedures for developing
a pool of unit job objectives, we tried to predict the kinds of

problems that would be encountered by writers of unit objectives, and began work on prescribing how these problems might be solved. After documenting and examining the problems and prospective solutions, we decided that any effort to develop a handbook for specifying unit performance objectives would result in a product that would add little to the information that already is available. The training-development manuals mentioned earlier (Gropper and Short, 1968; Briggs, 1970; Schumacher and Glasgow, 1974) contain procedures for specifying job content. More importantly, some of the problems involved in specifying unit job objectives may require major research and development efforts for their solution. And until the problems are solved, a technology for specifying unit performance objectives will not be forthcoming. Any attempt to cast the (largely non-existent) technology in the form of a handbook would be gratuitous.

The focus of the project therefore shifted to the second of the two objectives cited earlier: isolating problems associated with specifying unit objectives.

After the problems in specifying unit job objectives were identified, discussions about priorities for solutions were held with sponsor representatives. Two top-priority problems were identified:

      1. Unnecessary reliance on expert opinion in specifying unit job and training content.

      2. Unreliability in measuring unit performance.

As a result of identifying these two problems, the project took two new directions.

One new direction was a small-scale, pilot critical-incident study with veterans of armored combat. The purpose of the study

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was to compare actual examples of effective and ineffective combat performance with the task descriptions of combat jobs that resulted from the earlier HumRRO project (O'Brien et al., 1974). If the critical-incident study uncovered tasks that were not included in the task descriptions, a rather dramatic case could be made for the inclusion of objective methods for identifying the content of combat jobs in any technology of unit performance.

The second new direction was in response to suspected unreliability in the measurement of armor unit performance. Considerable sums are being spent in designing and implementing large-scale evaluations of simulated armor combat. Yet certain fundamental characteristics of good measurement seem not to be being incorporated into the evaluation designs. The main measurement problems center around inter-observer reliability -- the extent to which two or more observers measuring the same thing produce similar results. Because of the immediacy of the need for solving measurement reliability problems (large-scale unit performance measurement is ongoing), the main thrust of the project shifted to designing and implementing research to find ways for improving inter-observer reliability in unit performance measurement.

Purpose

The rationales and directions discussed above provided the basis for restating the project objectives:

1. To identify problems in specifying unit performance objectives.

2. To try out an alternative to "armchair" approaches to defining job content.

3. To design and begin implementing research for improving reliability in measuring unit performance.

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The results of addressing these three objectives are described
in the remaining three sections of this report.

SPECIFYING UNIT PERFORMANCE OBJECTIVES

Each of the three parts of unit performance objectives --
conditions, tasks, and standards -- raises several problems that
serve as barriers to developing a technology of unit performance
objectives.

Specifying Conditions

The purpose of stating conditions as part of an objective is
to provide a basis for readers of the objectives to determine
whether or not the conditions have been fulfilled and the objec-
tive met. This goal of observer agreement demands that conditions
statements be as specific as possible, and preferably quantitative.

One aspect of the goal mentioned above is to permit persons
other than the writer of the objective to devise training or
evaluation programs that conform to the stated conditions.
Standardizing stimulus presentation in training and evaluation
requires precision in statements of conditions.

Problems associated with specifying conditions arise as a
consequence of the necessity for efficiency or cost-effectiveness
in job description. Resources are limited, so selectivity must
be exercised in specifying conditions. The main problems that
face the objective writer in specifying conditions are:

1. Selecting conditions for inclusion in the
objective. For a variety of reasons, it is
not feasible to include in the objective all
conditions that might be encountered on the
job or during a mission. The problem then
is how to select, from the vast array of
conditions that might be encountered, those
conditions that will be included in the
objective.

2. Selecting "levels" for the conditions. Once
   a set of conditions has been chosen for in-
   clusion in an objective, one must decide
   upon appropriate levels or modifiers for
   each condition.

Selecting Conditions for Inclusion in Objectives

In the conditions part of job objectives for tank gunnery,
one never finds references to the fact that the crew must be
wearing shoes, or to the days of the week on which training and
testing are to take place. This is because the writer of the
objective has decided that the presence of shoes, and day of
the week are not likely to exert significant effects on the crew's
performance of gunnery tasks. On the other hand, size and range
of target almost always are included as conditions in tank gun-
nery objectives, because it is universally agreed that size and
range have decided effects on crews' gunnery performance. These
examples suggest the criterion for selecting conditions to include
in job objectives: "What conditions are likely to exert the most
dramatic effects, for better or worse, on task performance?" The
ways in which this question usually is answered range from the
objective writer's answering it implicitly ("in his head") to
the use of formal rating scales. Or the writer may make educated
guesses about the conditions that are most likely to affect task
performance, write his objectives accordingly, and then have the
objectives reviewed by subject-matter experts.

The approaches mentioned above have the advantage of low
cost, which probably accounts for their widespread use. The
disadvantage of these approaches is that they ultimately rely on
opinion as the basis for deciding which conditions are important
enough to include in objectives. An identical problem arises in
the use of criticality ratings for the selection of tasks for

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inclusion in training. Possible solutions for these problems are discussed later, in <u>Selecting Tasks for Inclusion in Training</u>.

<u>Selecting "Levels" for the Conditions</u>

Once the objective-writer has decided on which conditions to include in his objective, he is immediately faced with deciding what levels or modifiers to attach to the conditions. Given that target range is likely to affect gunnery performance, what orders of magnitude should be associated with "range?" The answer to this question may seem obvious. In specifying job performance requirements, the objectives should include all levels of conditions that are likely to be encountered on the job. But problems arise in trying to apply this maxim.

The main problem comes in trying, on the one hand, to arrive at a set of levels for the objectives that is sufficiently comprehensive to describe the job in its entirety; and, on the other hand, trying to avoid proliferation of the total number of objectives by including too many levels of conditions. At one extreme, for example, one could say that tank crews will be able to neutralize targets at any range, travelling at any speed, under any conditions of visibility. And, in fact, this is what a tank crew's "job" really is about. But in specifying job objectives, one needs to relate conditions such as target range, speed, and visibility to performance standards. Job objectives that require neutralizing any target at any speed under any conditions of visibility will, therefore, be unsatisfactory, because performance standards would differ depending on the <u>level</u> of speed, visibility, or type of target.

At the other extreme, one might consider writing separate objectives for targets moving at 8 MPH, 8.1 MPH, 8.2 MPH; or for

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targets at 1000 meters, 1001 meters, 1002 meters, etc. Such a
procedure would, of course, result in a proliferation of
objectives -- considerably more than the number of objectives
necessary to describe how targets could be neutralized.

There are no hard and fast rules for resolving the dilemma
described above. A tentative "rule" was suggested in our report
on tank gunnery job objectives (Kraemer, et al., 1975): Include
only those levels of conditions in objectives that will require
responses that are different from the responses required by
objectives with other levels. "Stationary and moving" are, on
the one hand, two levels of the target-motion condition. And
firing at stationary targets requires responses that are different
from those required to fire on moving targets. Thus, separate
objectives should be written for stationary and moving targets.
SABOT and HEAT, on the other hand, are two levels of the ammuni-
tion condition. But firing SABOT or HEAT at a tank at less than
1100 meters can be treated as a single objective, since the gunner's
responses are the same regardless of whether HEAT or SABOT is used.

Specifying Tasks

There is a wealth of literature on task description and
analysis, describing ways for specifying the tasks, skills, and
knowledge required for effective job performance. Carefully
conducted task analyses can yield useful information about what
needs to be known and what needs to be done in order to perform
job tasks effectively. The main problem that will be encountered
in specifying job tasks for units or for individuals is that the
results may not be comprehensive; that is, some job tasks may not
be uncovered by the analysis. The usual way of avoiding this
possibility is to have job incumbents, supervisors, or other

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experts review the results of the analysis for comprehensiveness.
The experts are asked, in essence, by the researchers, "Have we
left anything out?"

Another way to check on the comprehensivenss of a job task
analysis is by the use of critical incidents. The Critical
Incident Technique (Flanagan, 1954) involves gathering data on
actual examples of extremely effective job task performance and
of extremely ineffective job task performance. The data may be
obtained from job incumbents, supervisors, existing records, or
other sources. An example of an effective incident in armor
combat would be, "Before the platoon proceeded through dense
sugarcane field, the Tank Commander divided the field into five
sectors, each of which was then swept with .50 caliber machinegun
fire. Proceeding through the field, we noticed that several anti-
tank entrenchments had been wiped out by the machinegun fire."
An example of an extremely ineffective incident would be, "Tank
Commander ordered unit to cross stream at shallow points. Enemy
had anticipated this, and mined the stream banks. Several
casualties were sustained."

The Critical Incident Technique was used during the present
project, in order to check on the comprehensiveness of a job task
analysis that had been done for an armored attack mission. The
results indicated that there were indeed some job tasks that had
been overlooked during the intial analyses. More importantly, we
found that, although expert reviewers had agreed that the initial
analyses described the job adequately, the critical incidents
revealed that, in the real world, the job frequently was not done
"by the book." The point here is simply that the results of task
descriptions that are generated on an "armchair" basis may not

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agree with the results of more objective job analysis techniques.
This seems especially true when a large body of literature or
"doctrine" exists on how the job should be done.

Additional details about the critical-incident study are
presented later in this report.

Selecting Tasks for Inclusion in Training

Once a comprehensive set of job objectives has been specified,
a basis has been provided for selecting job tasks for inclusion in
training.

Of all the problems facing the training developers, probably
the most difficult to solve is deciding which tasks, skills, and
knowledge to include in training. As noted earlier, task analyses
can yield useful information about what needs to be known and what
needs to be done in order to perform job tasks effectively. But
task analyses do not automatically yield information on what needs
to be taught (that is, included in training). The distinction
between what needs to be known and done, and what needs to be
taught is important, and all too frequently overlooked by training
developers. As is the case for deciding which conditions to
include in objectives, limited training development resources demand
that selectivity be exercised in deciding which skills and knowl-
edge will be included in training. Most job-relevant skills and
knowledge will be included in training, but others must be left
out. So the question arises: "How do we decide what to include
and what to exclude?"

Conventional job analysis methods deal with the problem of
selecting tasks for inclusion in training in the following way:
a job analysis is conducted, resulting in a task inventory. Skill

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and knowledge requirements are inferred for each task, and these define what needs to be done and known on the job. Expert judgment is then used to rate the "criticality" of each task, skill, and knowledge. Tasks, skills and knowledge receiving the highest criticality ratings are selected for inclusion in training, and those receiving low criticality ratings are excluded. Pretests administered to prospective trainees also are used sometimes, for determining which tasks, skills, or knowledge to exclude from training.

Most training developers do not provide us with sufficient data for judging the extent of agreement among raters as to task criticality. One seldom sees data on inter-rater reliability of criticality ratings. And one never sees data on _intra_-rater reliability (the extent to which one rater's task criticality ratings would be the same from one time to the next). Most frequently, the bases for the criticality ratings are not even made explicit. And at the extreme, the "ratings" are done in the head of the training developer, using criteria never to be divined.

What role, if any, can or should be played by the objective-writer in solving inter-rater reliability problems is not clear. To the extent that he can influence training development policy though, he should suggest that permanent records of criticality ratings be generated, and should assist in the design or selection of methods for objectively examining inter-rater reliability. The need in this area seems greatest for long-range planning of research, especially on ways to increase inter-rater reliability; as for example, by the use of various kinds of instructions and training for performing the ratings, and by the use of alternative rating scales and techniques. Our initial efforts in these directions are described later in this report.

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Related to the inter-rater reliability problem is the issue of the validity of task-criticality ratings. Conceivably, raters could reach total agreement on task criticality and still be wrong about which tasks are, and which tasks are not critical to effective job performance. And if the experts are wrong, very little about training programs based on their criticality ratings can be right. Important (critical) skills and knowledge will be excluded from training. Irrelevant skills and knowledge will be included. And programs will be developed that teach "the wrong things."

The greatest need here is for alternatives or supplements to "armchair" methods for deciding on training content. Any method that decreases reliance on expert opinion is appropriate. Here again, the Critical Incident Technique may be used. Use of the Critical Incident Technique requires that several hundred examples be collected, both for ineffective and effective job task performance. Descriptions are prepared of the events leading up to and surrounding each incident. This information is used for identifying serious and frequent performance errors on the one hand, and extremely effective job task performance on the other. Training programs are then developed on the basis of these factual data -- programs that focus on eliminating serious and frequent errors, and on teaching those skills and knowledge that distinguish excellent performance from mediocre or poor performance.

A method that is related to the Critical Incident Technique has been used in accident research, and may have relevance for determining training content. It involves collecting factual reports on near-misses. Applying the method to determining the content of training for combat would involve, for example, interviews with crews whose tanks had been disabled in combat. The

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purpose here would be to determine what went wrong and to try to avoid recurrence of performance errors by reflecting the results of near-miss data in training content.

Finally, it might be possible to determine training content for units using some of the methods that are used in selection-test development. Two units could be identified, for example, one of which had, according to some agreed-upon criteria, performed extremely well in combat, and the other of which (according to the same criteria) had performed poorly. Job-relevant test batteries could be administered to members of both groups, and the results analyzed to determine skill and knowledge differences between the groups. These differences could be fed into the training development system, with the goal of designing instruction that would teach skills and knowledge that distinguish excellent from mediocre or poor job performance. Implementation of such an approach would, however, present problems. The first is the criterion problem: on what basis is the initial distinction between "good" and "bad" groups made? A second problem is in domain-definition; that is, in choosing the skills and knowledge on which the two groups are evaluated. These problems probably are not insurmountable, as suggested by the fact that valid selection methods do exist for some jobs -- methods that were developed only after the criterion and domain-definition problems had been solved.

The use of any of the methods cited above would go a long way toward solving two of the problems that face the writers of unit performance objectives: selection of conditions for inclusion in objectives, and selection of tasks for inclusion in training. More importantly, a much needed objective data base would be provided for the development of unit training and evaluation, which currently seems to rely exclusively on expert opinion for determining content.

Specifying Standards

As noted earlier, unit performance standards should contain separate indicators of production, quality, and cost.

The main problem facing the writer of job performance objectives in specifying standards is, "Where do I get the information necessary for setting the standards?" Objective-writers should recognize that:

1. The best standards will be those that are based on objectively obtained data about system requirements.

2. Regardless of the sources of information for setting standards, final decisions about the content of standards will be policy matters, and will be made by the objective-writer's "customer." The objective-writer may provide the customer with information relevant to making decisions about standards, but he hardly ever is in a position to dictate these decisions.

In setting standards for combat or other gaming performance, the best decisions about standards will be made on the basis of the system requirement to defeat opponents. If the objective is to defeat opponents, then job performance standards should be set on the basis of the best available information on opponents' capabilities. If, for example, prospective opponents' tank crews can open fire in five seconds and neutralize targets within seven seconds, then our performance standards should at least reflect the need to neutralize targets within six seconds.

Information about system requirements or opponents' capabilities frequently is not available to persons involved in specifying job performance standards. And without information on opponents'

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capabilities, the field is thrown open to debates (about "what the standards should be") by almost anyone who has an opinion. In a recent project (Kraemer and Boldovici, 1975) to specify job performance requirements for tank gunnery, for example, we were unable to obtain data on enemy gunnery capability, and were forced to specify standards on the basis of the opinions of a panel of gunnery experts. Shortly after releasing our report, we began to receive comments from other gunnery experts telling us that our standards were "wrong." Additional inquiry revealed that our critics did not have information on enemy capabilities either. They simply felt that our standards did not reflect "the full capability" of the weaponry. The point here is that standards are neither inherently wrong or inherently right. Standards either do or do not reflect system requirements. And when system requirements are unknown, any debates about "rightness" or "wrongness" of standards are meaningless.

Even if precise data on system requirements and opponents' capabilities are available, decisions about standards remain policy matters and will be made by the "buyer" of the job objectives. Policy decisions on standards can take any number of forms. As implied above, they can be based on careful consideration of system requirements and opponents' capabilities. At the other extreme, the buyer can simply decide on a standard because, "That's what I want it to be." This may seem arbitrary to the objective-writer, who may have better ideas on how standards should be established. Such decisions usually are not totally arbitrary, however, as the policy-maker usually has some relevant information on which he is basing his decisions about standards. In this case, it is the obligation of the objective-writer to "get out on the table" the information on which the customer's decision is based, to review this information with the customer, and if appropriate, to

suggest alternatives. A frequent problem here is that the customer sets standards that are unrealistically high in light of equipment, human performance, or fiscal limitations, which prevent attaining the standards. In this case, it is the obligation of the objective-writer to point out the difficulties involved in achieving the unrealistically high standards, and to suggest compromises.

Job performance standards frequently are set on the basis of normative performance of job incumbents. Training developers, for example, may obtain measures of central tendency on certain aspects of incumbents' job performance, and use these measures as a basis for setting training standards or for recommending job performance standards. One often reads reports and proposals in which training developers contract to develop programs in which:

1. Graduates of the new program will be just as proficient as incumbents, but with significant savings in training costs.

2. The proficiency of graduates of the new course will exceed the proficiency of incumbents by some given amount, with no increase in cost.

Similarly, standards could be set on the basis of the normative performance of recent graduates of an "old" course, rather than on the basis of job incumbents' performance.

The advantage of setting job performance standards on the basis of normative performance is that the standards will be, in some sense of the word, "realistic." As such, they are better than standards that are derived arbitrarily. The disadvantages are that:

1. Setting standards on the basis of normative behavior requires that there is available a sample of incumbents or graduates on which

measurement can be or has been made. This
may not be the case as, for example, in
developing standards for a new job.

2. Normative performance may not reflect system
requirements: our best crews may be able to
score second-round hits within 10 seconds.
But if the enemy can hit targets within 5
seconds, the normative performance of our
gunners is largely irrelevant for standard-
setting purposes.

The points noted above have implications for a practice that
seems widespread in setting job performance standards. The
practice is based on the assumption that, as the conditions under
which tasks are to be performed change, standards for minimally
acceptable task performance must change; e.g., if prevailing
conditions make task performance more difficult, then the stan-
dards for performance of the task should be lowered. This assump-
tion is valid if standards are based only on normative performance:
if conditions affect normative performance, and if standards are
based only on normative performance, then conditions do have an
effect on standards. The point of view that conditions must
affect standards, however, seems to ignore the possibility that
standards may be based on something other than normative perform-
ance; e.g., system requirements.

Conclusion

Writers of unit performance objectives will encounter unique
problems in trying to specify conditions, tasks or activities,
and standards.

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The main problems to be solved in writing the conditions parts of unit objectives will involve:

1. Selecting, from the entire range of conditions that might affect job performance, a set or sets of conditions for inclusion in the job objectives.

2. Selecting levels for the conditions that will be included in the objective.

Solving the first of these two problems reduces to answering the question, "What conditions are likely to exert the most dramatic effects, for better or worse, on task performance?" Answering this question involves methods analogous to those used to assess task criticality. The objective writer should strive to formalize and "objectify" procedures for assessing the criticality or importance of conditions. "Armchair" assessments should be avoided. If expert judgment is used, means should be provided for assessing inter-rater reliability. Critical incidents can be used to identify "real-world" conditions that affect task performance.

After selecting a set of conditions for use in the objectives, the objective-writer must select levels or modifiers for each condition. Since the number of objectives will increase with the number of conditions and levels within conditions, selectivity must be exercised if proliferation of objectives is to be avoided. At the same time, conditions should not be stated so generally as to preclude attaching a standard to the objective. There are no hard-and-fast rules for avoiding proliferation of objectives on the one hand, and "too-general" objectives on the other. A guideline was suggested, however: Include in the conditions part of the objectives only those levels that will require manipulations or operations that are different from those required by other levels. Separate objectives should not, for example, be written

for tank crews firing battlesighted SABOT or HEAT (two levels of
the ammunition condition) at a tank at less than 1100 meters,
because the operations performed by the crew members will be the
same for both kinds of ammunition. But firing at stationary or
moving targets (two levels of the target-motion condition) should
be treated as separate objectives, because firing on moving
targets requires operations that are different from the operations
required for firing on stationary targets.

In specifying unit job tasks or activities the objective-
writer will have to use some means for checking on the compre-
hensiveness of his analysis; that is, for making sure that no
important job tasks, skills, or knowledge has been omitted from
the pool. Review of the task list by experts is the usual method
for checking on comprehensiveness. Another method for checking on
the comprehensiveness is to compare the task list with a sample
of critical incidents for the job.

If the writer of unit job objectives also will be involved in
writing unit training objectives, he will have to make decisions
about which objectives, tasks, skills, and knowledge to include
in training, and which to exclude. Pre-tests can be used to
determine knowledge and proficiency levels of entering trainees,
as a means for deciding which job objectives to exclude or address
minimally in training. If task criticality ratings are used for
determining training content, they should be formalized to permit
assessing inter-rater reliability. Critical incidents can be used
to establish task criticality on the basis of "real-world" job
experiences of incumbents. Two other methods were suggested for
decreasing reliance on expert judgment in deciding what to include
in training. One of the methods involves collecting "near-miss"

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data from members of combat units. The other involves objective determination of skill and knowledge differences between units that have performed effectively in combat, and units that performed poorly.

In specifying unit performance standards, the objective-writer may find that information he needs is unavailable; namely, information on capabilities of prospective opponents. Standards for combat performance should not be set on the basis of expert judgment, for if the experts are wrong, the results may be disastrous. Nor should standards be set on the basis of the normative performance of trainees or "qualified" units. Normative data can tell us how good a unit is, but not how good it needs to be. Standards for combat performance should be set on the basis of the best available information about the enemy's capability.

Overall then, the most important problems that will have to be solved by writers of unit performance objectives are problems associated with reliance on expert opinion, in specifying the conditions under which job tasks are to be performed, in defining job content and training content, and in setting performance standards. To the extent that reliance on expert opinion in these areas can be supplemented with objectivity, the quality of the data base from which the design and evaluation of training proceed will be improved.

CRITICAL INCIDENT STUDY

A small-scale critical-incident study was undertaken with
veterans of armored combat, for the purpose of comparing the
results with existing task lists for armor missions. The impetus
for the study was the suspicion that existing task data, generated
on an "armchair" basis, may not reflect actual performance of
job tasks in combat. If training for combat is based on an in-
accurate or incomplete data base, serious performance errors can
be expected to occur in combat.

Approach

Military personnel at Fort Knox, Kentucky and Fort Hood,
Texas, who had combat experience as part of tank or armored
cavalry units, were interviewed. They were asked to report
specific examples of effective and ineffective performance which
they had observed first-hand in combat.

U.S. armor experience in Vietnam has been extensively
documented in reports such as Armor Monographs, Lessons Learned,
and Armor Magazine. These reports were reviewed, in order to
obtain critical incidents in addition to those resulting from
the interviews.

While the interviews and the review of documents were ongoing,
the data collection methodology became increasingly focused and
routinized, to the point where a questionnaire format was even-
tually designed and used for collecting additional incidents.
(The questionnaire is attached as Appendix A to this report.)
In all cases where the investigators had difficulty interpreting
questionnaire responses, or where responses were judged incomplete,
a follow-up clarification interview was held with the respondent.

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The three data sources -- the interviews, questionnaires, and readings -- yielded 73 examples of extremely ineffective, and 163 examples of extremely effective performance in armored combat.

Classification and Analysis

After transcribing each incident onto a standard index-card format[1], the incidents were sorted and analyzed in two ways. First, a content analysis was performed, in order to find a small number of categories within which to summarize the incidents for presentation in this report. Next, each incident was classified according to the one major mission operation, duty, or task identified in an earlier project (O'Brien, et al., 1974). Incidents that did not "fit" into any of the available classes were separated from the rest of the incidents.

Results and Discussion

Content Analysis

The results of the critical-incident content analysis are summarized in Table 1. Descriptions of the content categories, and summaries of the kinds of incidents subsumed by each category follow.

The greatest number of incidents, both effective and ineffective, were classified under the major category, "Combat Action." Within this category, "quick and decisive action" was the most frequently mentioned cause of effective incidents. The five ineffective quick, decisive-action incidents

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[1] Narratives of the incidents, edited mainly for grammar and punctuation, are presented under separate cover (Boldovici, et al., 1975).

TABLE 1

SUMMARY OF CRITICAL-INCIDENT
CONTENT ANALYSIS

CONTENT CATEGORIES		NUMBER OF INCIDENTS	
		EFFECTIVE	INEFFECT.
COMBAT ACTION	Quick, decisive action	41	5
	Coordination, communication	4	11
	Use of intelligence	3	6
	"Creative" combat action	12	4
	Miscellaneous	28	19
WEAPONS AND AMMUNITION	Selection	10	5
	Operation	1	3
	Maximized unit firepower	10	3
	Maximized support firepower	11	2
SAFETY	Created new procedures	5	0
	Followed standard procedures	4	4
FIELD EXPEDIENTS	Non-combat	9	0
	Combat	25	11
TOTALS		163	73

pertained both to situations in which quick, decisive action was taken, but the action proved "wrong"; and to situations in which quick, decisive action was not taken.

The effective "coordination, communication" incidents pertain to coordination both of weapons and personnel, to briefing subordinates, and to maintaining communications with other units. Ineffective incidents in this category included failure to ensure that all personnel understood the battle plan and their role in it, and failure to supervise closely and maintain discipline.

Effective use of intelligence included reliance on experienced personnel, and taking their opinions into account before making decisions. Ineffective use of intelligence included ignoring suggestions of others, and failure to use available information.

The effective incidents that were classified under "creative combat action" pertained to personal sacrifice and courage, as well as creating novel solutions to combat "problems." The four ineffective creative-action incidents were ones in which a unique solution was tried, but without success.

The effective "miscellaneous" incidents included any reasonable, well evaluated response to enemy presence; e.g., tactics that were effective but not "new." Ineffective "miscellaneous" incidents included failures to follow standard operating procedures, carelessness, and jobs inexplicably "botched."

The sub-categories under "Weapons and Ammunition" seem self-explanatory: units either did or did not select preferred weapons or ammunition, did or did not use weapons or ammunition properly, and did or did not capitalize fully on their own or supporting units' firepower.

The entries under "Safety -- created new procedures" all
pertained to measures taken to provide additional protection for
crew members inside tanks and APCs -- lining hulls and decks with
flak jackets and steel, for example. The ineffective incidents
under "followed standard procedures," pertained not to following
standard procedures that were ineffective, but to failure to
follow standard procedures; e.g., failing to wear a helmet
inside the tank.

The effective incidents classified under "Field Expedients"
pertained in all cases to creating and using new problem solutions.
The ineffective field expedients all were examples of failure to
follow standard operating procedures.

Comparisons with Task Descriptions

The comparison of the critical incidents with the existing
mission, duty, and task descriptions was by no means "one-to-one."
This was expected, since the critical incidents were written at a
level of detail that was different from the level of detail used
for describing the missions, duties, and tasks. Whereas each
incident comprised an entire scenario or vignette of performance
in combat, the task descriptions portrayed behavior at a more
elemental level. The behavior described in nearly every incident
was comprised of more than one "task." Thus it was possible to
associate nearly every incident with at least one (and often
several) of the duties or tasks in the existing lists. Even with
the small sample (n = 236) collected during this study though,
about a fifth of the incidents could not be related to any of the
duties or tasks in the original lists.

The incidents which did not "fit" into the existing task-
descriptive framework pertained mainly to safety, and to creating
novel solutions to combat and non-combat problems. Examples of

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safety-related incidents included deliberately straightening
grenade pins to make their removal easier, and then having them
removed accidently; attempting to remove ammunition from a
burning tank, and loading and accidentally firing the caliber .50
machinegun while the tank was moving. Examples of creating novel
problem solutions included using a trim vane or steel plate on
APCs for anti-tank protection, changing radio call signs, using
various techniques for making the platoon leader's tank indis-
tinguishable from others, and lining hull interiors for added
protection against shrapnel. Notice that teaching and evaluating
safety-related and problem-solving behavior are areas that present
problems for performance-oriented instructional designers. This
is so because of difficulties involved in arranging realistic
consequences for ineffective safety-related and problem-solving
behavior in training -- consequences that in combat might include
injury and death.

The only firm conclusion that can be drawn on the basis of
this comparison is that the existing task descriptions were not
comprehensive; that is, some of the critical incidents could not
be related to the existing task descriptions. This is by no
means an indictment of job or task analysis as a method. Nor is it
a "pitch" for the exclusive use of critical incidents in defining
job content. Perhaps conclusions can best be drawn by speculating
on the consequences of using exclusively either the existing task
descriptions or the critical incidents as a data base from which
to design and evaluate unit training.

The task descriptions may have been sufficient as a data
base from which training development could proceed for teaching
"basics." And (with considerable ingenuity) it should be possible

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to restructure and hierarchically arrange the elements of the task
descriptions into scenarios approximating the realism and complexity
of those described in the critical incidents. Even so, it would
be desirable to have some independent means for checking on the
comprehensiveness of the performance-requirements "pool" generated
as described above, for if any skills and knowledge that are
required for effective performance in combat are omitted from the
job-requirements pool, then there is little hope that they will
be included in training. Additional costs that might accrue as
the result of ensuring the comprehensiveness of the data base
certainly could be justified in light of the risks associated with
the most likely alternative; namely, acquiring combat-relevant
skills and knowledge "on-the-job." Thus, the existing task
descriptions seem sufficient as a starting point for teaching and
evaluating some higher-order skills and knowledge. But if the goal
is to develop comprehensive training for combat, then some inde-
pendent means will be needed for checking on the comprehensiveness
of the data base from which training development is to proceed.

The behavior described in the critical incidents is complex,
and could not be performed without prior mastery of "basics."
This suggests using critical incidents as a basis for designing
scenarios for advanced training, and for end-of-course evaluation.
In any event, critical incidents alone would not suffice as a
comprehensive data base for designing and evaluating combat training.

The initial inclination is to conclude that, if one's goal is
to generate a performance-requirement data base that is compre-
hensive, and at the same time sufficiently detailed to include
basic as well as higher-order skills and knowledge, neither the
Critical Incident Technique alone, nor task analysis alone will

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suffice. Conceivably though, either method might do: the deficiencies may well be in conventional executions of the methods, rather than in the methods themselves. One wonders, for example, whether a task analysis of critical incidents might not yield a data base that is both more comprehensive and just as detailed as the results of conventional task analyses. Alternately one can conceive of (admittedly elaborate) programs for combining task elements into all manner of higher-order behaviors. Either or both of these methods might yield performance-requirement data bases that are both comprehensive and highly detailed. But until such time as the necessary development takes place, the most efficient course seems to be to use the Critical Incident Technique and task analysis simultaneously and in their conventional forms. Task analysis will yield behavioral descriptions at the necessary level of detail; and the critical-incident technique can be used for describing higher-order behavior, as an independent check on the comprehensiveness of the data base, and as a means for generating realistic training and evaluation scenarios.

MEASURING UNIT PERFORMANCE

New Army Training and Evaluation Programs (ARTEPs) are being developed by the Combat Arms Training Board (CATB) Fort Benning, Georgia, for worldwide Army implementation. As noted earlier, the new programs are designed to replace the Army Training Programs (ATPs) and Army Training Tests (ATTs), by combining the salient features of each into a training and evaluation system that is manageable at the unit level. The impetus for the change is the Army's ongoing emphasis on decentralization of training.

CATB was the "local sponsor" for the present project. The concept of local sponsorship, as used in connection with Army contracts, means that the project must produce results that are of direct relevance to an operating organization within the Army. The operating organization, or "local sponsor," approves contractor's proposals prior to award of the contract, and serves as liaison between contractor personnel and field units during performance of contract work.

The predecessor to the present project provided CATB with task descriptions for armor units at the company, platoon, and crew levels; along with documentation of the methodology that was used to develop the task descriptions (see O'Brien, et al., 1974).

Comparison of ARTEP and HumRRO Task Descriptions

During the early stages of the present project, another report was provided to CATB for use in developing armor ARTEPs: a comparison of the HumRRO task description for tank companies

and platoons, and tasks identified by ARTEP developers. The results
of this comparison are presented in Appendix B.

Perhaps the most notable aspect of the comparison is the dif-
ference between the numbers of tasks in the two lists: the HumRRO
list contains more tasks (and more detail) than does the other list.
This was expected, though, since the HumRRO list contains many
"intermediate" tasks, and the emphasis in ARTEP is on product
measurement. Even so, it is difficult to see the basis for sam-
pling "tasks" for inclusion in the ARTEP. Some of the "tasks"
in the ARTEP list are analogous to "duties" in the HumRRO list,
and others are analogous to "major mission operations." Most
likely an expert or panel of experts decided which operations
would be included for evaluation in ARTEP. Two questions must
be raised:

     1. Has an attempt been made to establish the
        criticality or relevance of the ARTEP tasks
        to success in combat?

     2. If task criticality was considered, how
        was it established; e.g., are data on
        inter-rater reliability available?

The results of ARTEP evaluations eventually will be used for
making changes in training for armor units. If the ARTEP is
"measuring the wrong things," then there is little hope that
the training modifications will yield job-relevant performance
improvements.

Research should be undertaken to identify, empirically or
rationally, tasks for inclusion in ARTEP. Critical incidents
could be used, as could the selection-test methods discussed
earlier. Or tasks could be selected from comprehensive task
lists for inclusion in the ARTEP, on the basis of criticality,

frequency of performance, or difficulty. In any event, the rationales for including tasks in the ARTEP should be made clear.

Measurement, Reliability, and ARTEP

Irrespective of what is being measured, or will be measured in armor ARTEPs, there is a need for incorporating characteristics of good measurement into the evaluations.

Characteristics of good measurement include objectivity, comprehensiveness, cost-effectiveness, validity, and reliability. The concern during the present project was with reliability, for measurement without reliability is of little value.

The results of training programs that are developed or modified on the basis of unreliable measurement will be analogous in every important respect to the results of housing construction by carpenters with rubber rulers. The results of unreliable measurement in carpentry might be ludicrous. But the results of unreliable measurement in training evaluation for combat could be disastrous.

The remainder of this report presents rationales for the conduct of research to improve the reliability of unit performance measurement, and describes relevant work that was initiated during this project. The rationales and descriptions of work are organized in five sub-sections:

> 1. The concept of measurement. Measurement is viewed as an aid to decision-making: the better the measurement, the better the decisions.

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2. <u>Measurement reliability</u>. Unreliability in measuring unit performance creates problems analogous to those that would be created by carpenters with rubber rulers.

3. <u>Sources of measurement reliability</u>. Measurement consists of three phases:

   a. Observer preparation.
   b. Observation.
   c. Recording and reporting.

   Variables that affect measurement reliability in each phase are discussed.

4. <u>ARTEP reliability</u>. ARTEP measurement probably is unreliable because of the influence of variables operating in each of the three measurement phases. If ARTEP measurement is unreliable, then wrong decisions about training needs will be made on the basis of ARTEP results. If the decisions about training needs are wrong, very little about the training developed on the basis of these decisions can be right.

5. <u>The role of photography in reliability research</u>. Research to improve ARTEP measurement reliability requires that the events to be observed "sit still" long enough to be measured, and be presented repeatedly and uniformly to various observers. Field studies are therefore impractical. The conduct of research to improve ARTEP measurement reliability requires the use of photography.

The Concept of Measurement

The limitations of human judgment have long been recognized, and have led people to devise measurement techniques in order to improve their capability to judge and decide. The results of measurement provide bases for making judgments and decisions. Obvious examples occur in carpentry. No carpenter would cut a

rafter based on an "eyeball" estimate of the required length or angle. Carpenters use rulers and squares to minimize errors of judgment (and waste) in estimates of length and angles.

Examples in the measurement of human performance may not be as obvious as in carpentry, but are perfectly analogous. In business, industrial, and military settings, managers must make judgments about other people. These judgments usually relate to suitability, readiness, preparedness -- for selection, for promotion, for training. As in carpentry, judgments made by "eyeballing" people result in many errors and considerable waste. Eyeballing in human performance appears as expert opinion. Too frequently, people are selected, trained, and promoted on the basis of "expert opinion" about readiness.

Problems associated with eyeballing human performance have long been recognized by the military. This recognition has led to the expenditure of millions of dollars in the area of human performance measurement. As in carpentry, the purpose of measurement in human performance is to improve decision-making capability.

Measurement Reliability

A central problem in all measurement, whether in measuring rafters, human performance, or simulated combat, is measurement reliability. Two kinds of measurement reliability are important:

1. Int   server reliability: the extent to
   whi   o or more observers produce similar
   mea   ent results.

2. Stability: the extent to which measures
   taken at one time are representative or
   predictive of measures taken at another
   time.

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Returning to the carpentry example, we can see that if rafters were measured with rubber rulers, we would have problems with both kinds of reliability mentioned above. Different measurement results would be obtained by (a) different observers, and (b) at different points in time.

Analogs to the rubber ruler are rampant in human performance measurement: rating scales, checklists, questionnaires, and expert judgment are used to measure human performance, with the frequent result that (a) different observers produce different results, and (b) measures taken at one time are different from measures taken at another time.

We are disturbed by what appears to be a growing trend in military research. More and more funds are being spent on "innovative" measurement techniques for human performance, while very little effort is being directed at resolving superordinate reliability issues. It is like funding research to modify everything about rubber rulers but their flexibility. Such research might produce rulers that were larger or smaller, easier or less expensive to use, or esthetically more pleasing. But until someone came along and said, "Now see here folks, these modified rubber rulers are very nice, but the damn things still stretch," no real progress would be made in the design of rulers.

Sources of Measurement Reliability

Measurement can be viewed as consisting of three phases:
1. Observer preparation.
2. Observation.
3. Recording and reporting.

Variables that affect measurement reliability are at work within each of the three phases of measurement -- variables that affect the extent to which two or more observers produce similar measurement results, and the extent to which measures taken at one time are representative of measures obtained at another. Systematic manipulation of variables within each of the three phases of measurement can increase measurement reliability -- whether our concern is with measuring rafters, human performance, or simulated armor combat. Hypotheses about the variables in each of the three measurement phases follow.

Observer Preparation. Reliability of measurement will increase with the consistency or uniformity of understanding among observers as to the rules of observation and recording. Ideally, observers should be standardized, and measures should be taken to assess the degree to which they have been standardized. We have hypothesized that measurement reliability can be increased by manipulating the following variables in the observer preparation phase:

1. Specificity of instructions. Reliability is likely to be greater when the instructions to observers are highly specific than when instructions are general and loosely stated.

2. Timing of instructions. Instructions to observers should not be given so far in advance of observation as to permit forgetting, nor so late as to preclude learning.

3. Practice in observing and recording. Measurement reliability will be greater when observers have practiced measuring and recording the events of interest than when they have not. The practice variable interacts with timing of instructions, in that instructions to observers should be given far enough in advance of observation to allow time for practice.

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4. Testing observers. Measurement reliability can be indirectly increased by the use of tests given to observers, to make sure that they are capable of performing whatever measurement operations will be required of them.

Observation. Even with very careful observer preparation and totally standardized observers, measurement reliability will be affected by variables at work during the observation (measurement) process.

Properties of the events or things to be measured can affect measurement reliability. Measurement of unidimensional events will, for example, be more reliable than measurement of multidimensional events (all other things being equal). This is related to perceptual "clutter," or limits on observers' information-processing abilities. Within rather broad limits, observers who are asked to make large numbers of simultaneous observations and measures will produce less reliable results than will observers making smaller numbers of observations.

Another property of the events or things to be measured that affects measurement reliability is stability (or its opposite, transience). The results of measuring the diameter of a wooden ball will be more reliable than will the results of measuring a mercury "ball" -- once again, all other things being equal.

Other properties of events to be measured that will influence reliability are time-sharing, noise, and "observability"; that is, measurement reliability may be expected to decrease with the extent to which the observed event is:

1. Time-shared with other events.

2. Embedded in noise.

3. Not directly observable.

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Strategies, rules, and procedures for measurement also affect reliability. Observers may be expected to perform more reliably, for example, to the extent that they are:

1. Required to make comparative rather than absolute judgments.

2. Given a well defined standard stimulus.

3. Alerted as to what to observe (anticipate likely errors).

4. Given the opportunity to observe an event more than once.

5. Given scoring aids (templates).

6. Required to measure only, and not process measurement results.

Recording and Reporting. Even with adequate observer preparation and careful control of the measurement process, measurement reliability will be affected by variables operating during the recording and reporting of measurement results. These variables include:

1. Timing. Measurement reliability will increase with decreased time between observation of the event of interest and recording of results.

2. Design of recording forms. Well designed data recording forms minimize the amount of judgment and decision-making required for their use, and thereby increase the reliability of recorded results. Simplicity in data-recording forms, for example, minimizes data-recording time, and therefore allows more time for observation.

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ARTEP Reliability

ARTEP measurement probably is unreliable because of the influence of all of the variables mentioned above. These variables serve to decrease the reliability of operations as simple and straightforward as measuring length with a ruler. The considerable complexity of ARTEP operations guarantees that ARTEP measurement reliability problems will be great.

In the observer preparation phase, for example, observers may not be standardized for any number of reasons. Instructions for measurement may be too general, and may not be given at the right time. Observers may not have enough practice to permit performing their measurement duties in accordance with the intent of the ARTEP designers. And practical constraints (e.g., time, money) may preclude ascertaining whether ARTEP observers are capable of performing their measurement duties before "turning them loose."

In the observation phase, observers may be required to make simultaneous judgments along more dimensions than their sensory apparatus can comfortably handle. The measurement instruments may permit too much subjectivity and expertising. Strategies for measurement may be inappropriate (single rather than multiple observations, for example). And the nature of the required judgments and decisions may invite unreliability.

In the recording and reporting phase, unreliability may be promoted by the length of time between observation and recording of results, and by formats for recording results.

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The influences of the variables discussed above demand that research be undertaken on methods for improving the reliability of ARTEP measurement, for measurement without reliability will lead to wrong decisions about training needs and about readiness.

Photography and Measurement Reliability

The conduct of measurement reliability studies requires that whatever is to be observed and measured (e.g., simulated combat) must:

    1. "Sit still" long enough to permit observers to make the required measures.

    2. Be presented uniformly or varied systematically for various groups of observers.

These two requirements, and the high cost of field studies using simulated combat, make the conduct of field studies of measurement reliability impractical. The requirements for "sitting still," for uniform or systematically varied presentation, and for low cost all can be met by the use of photography.

A motion picture of a tank platoon advancing to contact was produced during this project[1], for use by ARI in research to improve unit performance measurement reliability. The film was produced using the sand table at the Fort Knox television studio, and animation techniques. The sand table and animation were used, rather than filming a "live" meeting engagement, for two reasons. The first is low cost. The second is that the planned reliability research does not require perfect fidelity or realism in the events

---

[1] Copies of the film, the scenario, and materials for incorporating the film into a briefing on measurement reliability are on file at ARI and HumRRO.

to be observed and evaluated. As noted earlier, the main requirement is for a set of events that can be presented uniformly to various observers, or varied in accordance with requirements of the experimental design.

Subtle errors in tactics and operations have been deliberately incorporated into the film, for the purpose of producing variability in observers' responses to events presented in the film. And by editing videotape versions of the film, the amount of information available to various groups of observers can be systematically varied.

Studies to improve measurement reliability take the following general form: A set of events is selected for observation and measurement (e.g., a part of the ARTEP). Several groups of subjects view the events, observing, measuring, and evaluating according to instructions and experimental conditions. Systematic variations are introduced in variables in any or all of the three phases of measurement. As implied earlier, variations could be introduced in the kinds of instructions given to observers, the specificity of the instructions, amount of practice given to observers, kinds of instruments and measurement strategies, etc. In all cases the dependent variable is an index of inter-observer reliability; e.g., a simple "percent-agreement" score to indicate the extent to which observers produce similar results measuring identical events. The manipulations in the variables that produce the greatest measurement reliability are identified, and incorporated into "how-to" literature for reliable measurement.

The conduct of research along the lines suggested above is strongly recommended, because the results would lead immediately

to action recommendations for improving measurement reliability, and could be incorporated directly into forthcoming ARTEP revisions -- or for that matter, into any program for measuring unit performance.

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APPENDIX A
CRITICAL INCIDENT QUESTIONNAIRE

HUMAN RESOURCES RESEARCH ORGANIZATION

HumRRO

DIVISION NO. 2
FORT KNOX KENTUCKY 40121

12 March 1975

Thank you very much for volunteering to be interviewed for our
Critical Incidents Study. In order to make the interviews brief, and
to take as little of your time as possible, we are mailing you three
(3) inclosures:

> Inclosure #1: Personal Data
>
> Inclosure #2: Interviewer's Critical Incident Form
> (3 copies)
>
> Inclosure #3: Interviewer's Critical Incident Form
> filled out with an example of successful
> critical incident

Please fill out Inclosure #1 (Personal Data) and return it to us
in the self-addressed envelope. As you can see, we will need your
name, and a telephone number where you can be reached for follow-up
questions, and scheduling an interview. But no names or organizational
affiliations will be mentioned in any of our reports. Our only
interest is in what happened -- we have no interest in <u>who</u> was involved.

The reason for sending you three copies of the form that our inter-
viewers will use is to trigger your thinking about the kinds of
questions that we will be asking. Please try to think of at least
three separate incidents that you personally observed in combat. If
you would like to make notes on the forms about the incidents and send
them to us with the Personal Data, we may not need to trouble you any
further.

If you can think of more than three incidents, fine -- we will
get them all with a telephone follow-up or in an interview.

Remember that critical incidents are examples of extremely <u>effec-
tive</u> or extremely <u>ineffective</u> performance that you observed in armor/
cavalry combat -- actual cases where people either made an outstanding

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contribution to achieving an objective or accomplishing a mission, or "really blew it." Inclosure #3 is a sample of the interview form that has been filled out for an effective or successful incident. The incidents that you tell us about can either be successful incidents or unsuccessful ones.

In describing critical incidents, three main questions have to be answered:

1. What were the conditions, situation, or setting?

2. What action or behavior took place?

3. What were the outcomes or results of the action?
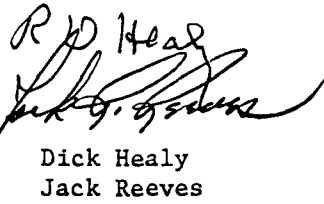
If you have any questions about participating in the project, or if you would like more forms for making notes, please call:

Mr. Dick Healy
or
Mr. Jack Reeves
(4-8113)

One of us will be calling you during the next few weeks to schedule an interview.

Thanks once again for your help.

Sincerely,

Dick Healy
Jack Reeves
Building 2422
Fort Knox, Kentucky 40121

3 INCLOSURES
   Personal Data
   Interviewer's Critical Incident Form (3 copies)
   Interviewer's Critical Incident Form (sample)

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INCLOSURE #1

PERSONAL DATA
(ADMINISTRATIVE CONFIDENTIAL)

When the incident(s) took place, what was your:

Grade _____

Branch _____

Job

_____ Tank or AR/AAV M551 Vehicle Commander

_____ Tank Platoon Sergeant

_____ Reconnaissance Platoon Sergeant

_____ Armor Cavalry Platoon Leader

_____ Tank Platoon Leader

_____ Armor Cavalry Troop Commander

_____ Tank Company Commander

_____ Other (Please Explain)

Name _____

Present Grade _____

Telephone Number _____

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INCLOSURE #2

INTERVIEWER'S CRITICAL INCIDENT FORM

INCIDENT WAS: SUCCESSFUL _____   OR   UNSUCCESSFUL _____

A. Situation

1. Mission

_____ a. Occupy and Depart Assembly Area

_____ b. Conduct a Tactical Road March

_____ c. Attack from a March Column

_____ d. Conduct Coordinated Attack

_____ e. Conduct Counter Attack

_____ f. Conduct Delaying Action

_____ g. Conduct Withdrawal

_____ h. Conduct Screening Operation

_____ i. Conduct Route Reconnaissance

_____ j. Conduct Area Reconnaissance

_____ k. Search and Destroy

_____ l. Convoy Escort

_____ m. Other (Please Explain)

2. Enemy Situation

a. Size _____

b. Composition _____

c. Disposition _____

d. Other (Please Explain) _____

_____

_____

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INCLOSURE #2 (cont'd)

3. <u>Terrain</u>

_____ a. Open Rolling

_____ b. Built-up Area (Town, City)

_____ c. Desert

_____ d. Jungle

_____ e. Mountain Area

_____ f. Swamp Like

_____ g. Other (Please Explain)

4. <u>Own Situation</u>

a. Unit Size _____

b. Duty Position _____

c. Year/Season/Day or Night _____

d. Area of Combat (Europe, Korea, Vietnam, etc.)

_____

e. Support Available _____

f. Other (Please Explain) _____

_____

_____

_____

B. Action

Behavior of both friendly and enemy forces. Briefly describe
what took place. What did the unit (crew/platoon/company/
troop) do? Include significant actions and/or reactions.

C. Results

What was the outcome? Did the unit accomplish its mission?
What happened as a direct result of the action?

D. <u>Evaluation</u>

Why do you consider the incident to be critical (successful/
unsuccessful)? Answer in terms of (a) the manner in which
the situation was handled, and (b) the results achieved.

E. <u>Effectiveness</u>

What would a more/less effective unit (crew/platoon/company)
have done in handling the situation?

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INCLOSURE #3

INTERVIEWER'S CRITICAL INCIDENT FORM (SAMPLE)

INCIDENT WAS: SUCCESSFUL __X__ OR UNSUCCESSFUL _____

A. Situation

1. Mission

_____ a. Occupy and Depart Assembly Area

_____ b. Conduct a Tactical Road March

_____ c. Attack from a March Column

_____ d. Conduct Coordinated Attack

_____ e. Conduct Counter Attack

_____ f. Conduct Delaying Action

_____ g. Conduct Withdrawal

_____ h. Conduct Screening Operation

_____ i. Conduct Route Reconnaissance

_____ j. Conduct Area Reconnaissance

_____ k. Search and Destroy

_____ l. Convoy Escort

__X__ m. Other (Please Explain)
ADVANCE GUARD

2. Enemy Situation

a. Size _____ COMPANY _____

b. Composition _____ INFANTRY _____

c. Disposition _____ MOVEMENT TO CONTACT _____

d. Other (Please Explain) _____

_____

_____

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3. <u>Terrain</u>

   __X__ a. Open Rolling

   _____ b. Built-up Area (Town, City)

   _____ c. Desert

   _____ d. Jungle

   _____ e. Mountain Area

   _____ f. Swamp Like

   _____ g. Other (Please Explain)

4. <u>Own Situation</u>

   a. Unit Size _____RECONNAISSANCE PLATOON_____

   b. Duty Position _____PLATOON LEADER_____

   c. Year/Season/Day or Night _APRIL 1945, DAYLIGHT__

   d. Area of Combat (Europe, Korea, Vietnam, etc.)

      _____FRANCE_____

   e. Support Available ___D.S. FIELD ARTILLERY_____

   f. Other (Please Explain) _____

   _____

   _____

   _____

B. Action

Behavior of both friendly and enemy forces. Briefly describe
what took place. What did the unit (crew/platoon/company/
troop) do? Include significant actions and/or reactions.

> Reconnaissance platoon conducting an advanced
> guard action part of a larger force. The pla-
> toon was taken under fire by the enemy. Platoon
> leader moved from the second vehicle to the lead
> vehicle and made an "on-the-spot" reconnaissance
> and rapid estimate of the situation. He deployed
> the·entire platoon and directed its fire on known
> enemy positions.

C. Results

What was the outcome? Did the unit accomplish its mission?
What happened as a direct result of the action?

> Effective fire was brought to bear on the enemy
> causing the enemy to withdraw.

INCLOSURE #3 (cont'd)

D. Evaluation

Why do you consider the incident to be critical (successful/
unsuccessful)? *Answer in terms of (a) the manner in which
the situation was handled, and (b) the results achieved.*

(a) A rapid and effective decision was reached
because the platoon leader was well forward
in the formation.

(b) Enemy resistance was eliminated.

E. Effectiveness

What would a more/less effective unit (crew/platoon/company)
have done in handling the situation?

Hesitate to bring all effective fire to bear on
the enemy and be less responsive in a critical
situation.

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APPENDIX B

COMPARISON OF HUMRRO AND ARTEP MISSION REQUIREMENTS

FOR TANK COMPANY AND PLATOON

TABLE OF CONTENTS

Page

UNIT: TANK COMPANY/TEAM

MISSION: ATTACK

ARTEP   HUMRRO

TASK

1. Prepare to Attack   (6.1) Plan Mission Operation
                                      1. Conduct Troop Leading
                                          Procedures
                                            Analyze mission
                                            Issue warning order
                                            Make estimate of situation
                                            Make tentative plan
                                            Complete operations plan
                                            Issue operations order

                                      2. Conduct Terrain Analysis
                                            Plan the reconnaissance
                                            Conduct local reconnaissance

                                      3. Conduct Coordination
                                            Coordinate with higher units
                                            Coordinate with adjacent units
                                            Coordinate with attach elements

                                      4. Identify Control Measures
                                            Identify control measures in
                                              offense
                                            Identify control measures in
                                              defense
                                            Identify control measures in
                                              delay

2. Use Attack Position   1. Move into Attack Position
    (NA if attack position is   Deploy into attack position
    from present position)   Exchange information with local
                                          CO

    NOT INCLUDED   2. Execute Passage of Lines
                                       Transfer responsibility with
                                          local CO
                                       Conduct passage through
                                          friendly troops

3. Use Supporting Fires to   3. Execute the Attack
    Prepare Objective   Request fire support

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ARTEP	HUMRRO

TASK

4.	Use Air Defense Weapons to Provide Defense from Enemy Air Threat	4.	NOT INCLUDED

5. Cross Line of Departure (LD)

5. Execute the Attack
    Cross line of departure

6. Move Prior to Contact

6. Execute the Attack
    Maintain attack formations
    Maintain surveillance
    Adhere to control measures

7. Action on Contact

7. NOT INCLUDED[1]

8. Assault the Objective

8. Execute the Attack
    Assault the objective
    Mass organic fires on objective
    Shift supporting fires
    Request fire support
    Maintain attack formations
    Maintain surveillance
    Adhere to control measures

9. Secure the Objective

9. Execute the Attack
    Sweep the objective

10. Render Reports

10. NOT INCLUDED[2]

---

[1] Maneuver attack force (Task 2.2.2.2 - Attack from March Column).

[2] Included in Sustaining Operations (Mission 8.1). Also SITREP 2.2.3.2.

ARTEP	HUMRRO

TASK

| 11. Consolidate and Reorganize on the Objective | 11. Prepare for Counterattack[3]
    Designate defensive areas
    Prepare defensive areas
     Establish cover
     Establish concealment
     Establish fields of fire
      and observation
     Establish surveillance and
      security
      Conduct local reconnaissance
      Establish OPs/LPs
      Establish dismounted sentries
      Establish mounted sentries
      Establish listening silence
    Coordinate fire support
     Coordinate organic fires
     Coordinate supporting fires |
| 12. Conduct Sustaining Operations | (8.1) Conduct Sustaining Operations
   1. Conduct Logistical Operations
     Maintain equipment
     Conduct resupply operations
     Feed personnel
     Reassign equipment
     Evacuate damaged equipment

   2. Conduct Administrative Operations
     Reassign personnel
     Receive replacements
     Process prisoners of war

   3. Conduct Command and Control Procedures
     Maintain communications
     Submit required reports
     Provide for succession of
      command |

---

[3] Could be Establish Local Security (Task 2.2.3.1) if continuing attack within two to three hours.

UNIT: TANK COMPANY/TEAM

MISSION: DEFEND

ARTEP	HUMRRO

TASK

1. Occupy Defensive Sector

1. Occupy Assigned Sector of Defense
   Establish primary defensive position
   Establish alternate defensive position
   Establish supplementary defensive position
   Establish blocking position

2. Establish Security

2. Provide Surveillance & Security
   Establish OPs/LSs[1]
   Establish dismounted sentries
   Establish mounted sentries
   Maintain light-noise-movement discipline
   Maintain listening silence
   Emplace trip flares[1]

3. Organize the Ground

3. Prepare Fighting Positions
   Establish cover
   Establish concealment
   Establish observation and fields of fire
   Mark routes between fighting positions

   Prepare Obstacles
   Construct physical obstacles
   Emplace protective minefields
   Emplace anti-personnel devices

4. Camouflage

4. INCLUDED IN ABOVE[2]

5. Integrate Defensive

5. INCLUDED IN BELOW[3]

---

[1] May not be required during Daylight Operation.

[2] Included in Task "Establish Concealment."

[3] Assumed as part of "Coordinated Fire Plan for Primary Positions."

	ARTEP		HUMRRO

TASK

6.	Prepare Fire Plan	6.	Prepare Coordinated Fire Plan Select target areas covered by direct fire Select target areas covered by supporting fire Prepare fire plan for primary position
7.	Plan Local Air Defense	7.	NOT INCLUDED[4]
8.	Organize and Position Team Trains	8.	NOT INCLUDED[5]
9.	Coordinate with Task Force and Adjacent Units	9.	Establish Alternate Communi- cations Establish wire communications Conduct Coordination[6] Coordinate with higher units Coordinate with adjacent units Coordinate with attached elements Identify Control Measures Identify control measures in the defense
10.	Complete Preparation for Defense	10.	NOT INCLUDED
11.	Support Task Force Security Elements	11.	Execute Passage of Lines[7] Conduct passage through friendly troops
12.	Defend Sector	12-13-14.	Execute Defense Engage enemy with fires
13.	Control Defensive Fire		Request and adjust supporting fires
14.	Repeal an Attack		Control distributions of direct fires

---

[4] Included in Task "Prepare Coordinated Fire Plan."

[5] BN Task NOT COMPANY...Also part of Task #9.

[6] Obtained tasks from other sections relevant to defense.

[7] Done as part of Sustaining Operations. Also SITREP 2.2.3.2.

	ARTEP		HUMRRO

TASK

15.	Render Reports	15.	NOT INCLUDED[8]
16.	Conduct Sustaining Operations	16.	See Mission 8.1

17.	NOT INCLUDED	17.	Move Out of Company Positions
			  Move out of primary position
			  Move out of alternate position
			  Move out of supplementary position

18.	NOT INCLUDED	18.	Occupy Company Positions
			  Occupy alternate position
			  Occupy supplementary position
			  Occupy blocking position

19.	NOT INCLUDED	19.	Reorganize the Defensive Position
			  Reassign defensive sectors of fire
			  Conduct after-action survey
			  Repair fighting positions
			  Reestablish local security
			  Prepare coordinated fire plan
			  Reestablish contact with adjacent units
			  Reestablish alternate communications
			  Reestablish wire communications

---

[8] Included as part of "Conduct Sustaining Operations."

UNIT: TANK COMPANY/TEAM

MISSION: DELAY

<u>ARTEP</u>   <u>HUMRRO</u>

<u>TASK</u>

1. Prepare to Delay

(6.1) Plan Mission Operation
   1. <u>Conduct Troop Leading</u>
      <u>Procedures</u>
       Analyze mission
       Issue warning order
       Make estimate of situation
       Make tentative plan
       Issue operations order

   2. <u>Conduct Terrain Analysis</u>
       Plan the reconnaissance
       Conduct local recon-
          naissance

   3. <u>Conduct Coordination</u>
       Coordinate with higher units
       Coordinate with adjacent
          units
       Coordinate with attached
          units

2. Organize Initial Delay
   Position and Select
   Subsequent Position

2. <u>Occupy Initial Delay Position</u>
    Establish primary delay
       position
    Establish alternate delay
       position
    Establish supplementary
       delay position
    Establish blocking
       position(s)

3. Camouflage

3. <u>Prepare Fighting Positions</u>
    Establish cover
    Establish concealment
    Establish observation & fields
       of fire
    Mark routes between fighting
       positions

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ARTEP		HUMRRO

<u>ARTEP</u>   <u>HUMRRO</u>

<u>TASK</u>

3. <u>Prepare Fighting Positions</u>
(Cont'd)

      <u>Provide Surveillance & Security</u>
        Establish OPs/LPs[1]
        Establish dismounted sentries
        Establish mounted sentries
        Maintain light-noise-movement
          discipline
        Emplace trip flares

4. Use Obstacles   4. <u>Prepare Obstacles</u>
        Construct physical obstacles
        Emplace protective minefields[2]
        Emplace anti-personnel devices[2]

5. Prepare Fire Plan   5. <u>Prepare Coordinated Fire Plan</u>
        Select target areas covered by
          direct fire
        Select target areas covered by
          supporting fire
        Prepare coordinated fire plan
          for firing position

      <u>Establish Alternate Wire Communi-</u>
<u>cations</u>
        Establish wire communications

      <u>Select Routes of Withdrawal</u>

6. Use Organic Weapons to   6. NOT INCLUDED[3]
   Provide Small Unit
   Defense

7. Conduct Delay   7-11. <u>Execute the Delay</u>
        Engage enemy with long-range
8. Engage Enemy   fires
        Request and adjust supporting
9. Avoid Decisive Engagements   fires
        Control distributions of
          direct fires

---

[1] Only for night engagements.

[2] Depends on support and materials available - allocated by TF
commander.

[3] Included as part of HumRRO Task #3.

TASK

10. Maintain Contact With the
    Enemy

11. Hold Enemy Unit Designated
    Time of Withdrawal

12. Organize Subsequent   12. Refer to Tasks #2, 3, 4, 5,
    Delay Positions   inclusively

13. Execute Passage of Lines   13. Displace Company to the Rear
    & Occupy a New Position   Execute disengagement of
                                         company elements
                                       Execute delay on successive
                                         positions
                                       Destroy supplies and equipment
                                         in danger of capture

                                     Withdraw Through Friendly Forces
                                       Coordinate passage of lines
                                        Coordinate routes of with-
                                          drawal through friendly
                                          position
                                        Coordinate contact and passage
                                        Coordinate recognition signals
                                        Exchange enemy & friendly
                                          information
                                        Coordinate fire support
                                        Coordinate passage through
                                          obstacles
                                        Coordinate number of vehicles
                                          and identify last vehicle
                                       Execute passage of lines

14. Render Reports   14. NOT INCLUDED[4]

---

[4] Included as part of "Conduct Sustaining Operations."

TASK

15. **Conduct Sustaining**   (8.1) Conduct Sustaining Operations
     Operations   1. Conduct Logistical Operations
                                              Maintain equipment
                                              Conduct resupply operations
                                              Feed personnel
                                              Reassign equipment
                                              Evacuate damaged equipment

                                         2. Conduct Administrative
                                              Operations
                                              Reassign personnel
                                              Receive replacements
                                              Process prisoners of war

                                         3. Conduct Command and Control
                                              Procedures
                                              Maintain communications
                                              Submit required reports
                                              Provide for succession of
                                                 command

UNIT: TANK COMPANY/TEAM

MISSION: TACTICAL ROAD MARCH

ARTEP   HUMRRO

TASK

1. Prepare for Road March   (6.1) Plan Mission Operation
                                  1. Conduct Troop Leading
                                      Procedures
                                       Analyze mission
                                       Issue warning order
                                       Make estimate of situation
                                       Make tentative plan
                                       Issue operations order

                                  2. Conduct Terrain Analysis
                                       Plan the reconnaissance
                                       Conduct local reconnaissance

                                  3. Conduct Coordination
                                       Coordinate with higher unit
                                       Coordinate with adjacent
                                         units
                                       Coordinate with attached
                                         elements

                                  4. Identify Control Measures
                                       Identify control measures
                                         in the offense
                                       Identify control measures
                                         in the defense
                                       Identify control measures
                                         in the delay

2. Organize and Dispatch   2. NOT INCLUDED[1]
    Quartering Party

3. Depart the Area   3. Move out of assembly area[2]

4. Use Organic Air Defense   4. NOT INCLUDED[3]
    to Provide Moving Unit
    Defense

---

[1] Part of HumRRO Task "Coordinate with Higher Units." Also a BN
Task.

[2] Identified in HumRRO Mission 5.1 "Occupy and Depart Assembly
Area."

[3] Included as part of HumRRO Task "Coordinate with Higher Units."

ARTEP	HUMRRO

TASK

	ARTEP		HUMRRO
5.	Cross Start Point (SP)	5.	<u>Maintain March Discipline</u> Cross start point (SP)
6.	Clear Start Point (SP)	6.	NOT INCLUDED[4]
7.	Conduct Road March	(7.1)	Conduct Tactical Road March

		1.	<u>Maintain March Discipline</u>
			   Cross start point
			   Maintain rate of march
			   Pass critical points
			   Cross release point

		2.	<u>Conduct Halts</u>
			   Conduct scheduled halts
			   Conduct unscheduled halts
			   Conduct refueling halts

8.	Maintain Road March Discipline	8.	Maintain Rate of March

9.	Maintain Road March Security	9.	<u>Maintain March Security</u>
			   Maintain surveillance
			   Maintain listening silence
			   Establish mounted sentries
			   Adhere to control measures

10.	Arrive at Release Point (RP)	10.	Cross Release Point (RP)
11.	Render Reports	11.	NOT INCLUDED[5]
12.	Conduct Sustaining Operations	(8.1)	Conduct Sustaining Operations

		1.	<u>Conduct Logistical Operations</u>
			   Maintain equipment
			   Conduct resupply operations
			   Feed personnel
			   Reassign equipment
			   Evacuate damaged equipment

---

[4] Part of HumRRO Mission 5.1 "Cross Start Point."

[5] Omitted from mission but identified in other missions.

HUMRRO

2. Conduct Administrative
   Operations
     Reassign personnel
     Receive replacements
     Process prisoners of war

3. Conduct Command and Control
   Procedures
     Maintain communications
     Submit required reports
     Provide for succession of
       command

UNIT: TANK COMPANY/TEAM

MISSION: OCCUPATION OF ASSEMBLY AREA

<u>ARTEP</u>   <u>HUMRRO</u>

<u>TASK</u>

1. Occupy Assembly Area   (6.1) Plan Mission Operation
                                      1. <u>Conduct Troop Leading
                                          Procedures</u>
                                            Analyze mission
                                            Issue warning order
                                            Make estimate of situation
                                            Make tentative plan
                                            Complete operations plan
                                            Issue operations order

                                      2. <u>Conduct Terrain Analysis</u>
                                            Plan the reconnaissance
                                            Conduct local reconnaissance

                                      3. <u>Conduct Coordination</u>
                                            Coordinate with higher units
                                            Coordinate with adjacent
                                              units
                                            Coordinate with attached
                                              elements

                                      4. <u>Identify Control Measures</u>
                                            Identify control measures
                                              in offense
                                            Identify control measures
                                              in defense
                                            Identify control measures
                                              in delay

2. Position Elements   2. <u>Conduct Reconnaissance</u>
                                            Conduct recon of route and
                                              assembly area
                                            Conduct recon of local area

3. Organize Assembly Area   3. <u>Occupy Assembly Area</u>
                                            Establish local area

B-14

<u>ARTEP</u>	<u>HUMRRO</u>

<u>TASK</u>

4. Establish Security

5. Organize Position

6. Establish Fire Support Plan

7. Receive Attachments and Dispatch Detachments

8. Camouflage

9. Repel Ground Probe

4. <u>Provide Surveillance & Security</u>
   Establish OPs/LPs[1]
   Establish dismounted sentries
   Establish mounted sentries
   Establish light-noise-movement
     discipline
   Maintain listening silence[1]
   Emplace trip flares[1]
   Establish concealment

5. <u>Prepare Fighting Positions</u>[2]
   Establish cover
   Establish concealment
   Establish observation & fields
     of fire
   Mark routes between fighting
     positions

   <u>Prepare Obstacles</u>
   Construct physical obstacles
   Emplace protective minefields
   Emplace anti-personnel devices

6. <u>Prepare Coordinated Fire Plan</u>[2]
   Select target areas covered
     by direct fire
   Select target areas covered
     by supporting fire
   Prepare the fire plan for
     primary position

7. <u>Occupy Assembly Area</u>
   Receive attached units
   Coordinate location of units

8. INCLUDED IN ABOVE[3]

9. NOT INCLUDED

---

[1] For night operations only.

[2] Tasks included in HumRRO's Defend Mission.

[3] Included in Task "Establish Concealment."

ARTEP	HUMRRO

<u>TASK</u>

ARTEP	HUMRRO

10. Conduct Sustaining Operations	(8.1) Conduct Sustaining Operations
	    1. <u>Conduct Logistical Operations</u>
	         Maintain equipment
	         Conduct resupply operations
	         Feed personnel
	         Reassign equipment
	         Evacuate damaged equipment
	
	    2. <u>Conduct Administrative</u>
	       <u>Operations</u>
	         Reassign personnel
	         Receive replacements
	         Process prisoners of war
	
	    3. <u>Conduct Command and Control</u>
	       <u>Procedures</u>
	         Maintain communications
	         Submit required reports
	         Provide for succession of
	           command

11. Perform Organizational Maintenance	11. INCLUDED IN ABOVE
12. Perform Recovery/ Evacuation	12. INCLUDED IN ABOVE

UNIT: TANK COMPANY/TEAM

MISSION: ILLUMINATED NIGHT ATTACK

<u>ARTEP</u>   HUMRRO

<u>TASK</u>

1. **Prepare to Attack**   (6.1) Plan Mission Operation
                                1. <u>Conduct Troop Leading</u>
                                    <u>Procedures</u>
                                      Analyze mission
                                      Issue warning order
                                      Make estimate of situation
                                      Make tentative plan
                                      Complete operations plan
                                      Issue operations order

                                2. <u>Conduct Terrain Analysis</u>
                                      Plan the reconnaissance
                                      Conduct local reconnaissance

                                3. <u>Conduct Coordination</u>
                                      Coordinate with higher units
                                      Coordinate with adjacent
                                        units
                                      Coordinate with attached
                                        elements

                                4. <u>Identify Control Measures</u>
                                      Identify control measures
                                        in offense
                                      Identify control measures
                                        in defense
                                      Identify control measures
                                        in delay

2. **Move to the Objective**   (2.1) Conduct Coordinated Attack
                                1. <u>Move Into Attack Position</u>
                                      Deploy into attack position
                                      Exchange information with
                                        local CO

                                2. <u>Execute the Attack</u>
                                      Cross line of departure
                                      Maintain attack formations
                                      Maintain surveillance
                                      Adhere to control measures

B-17

ARTEP   HUMRRO

TASK

3. Eliminate Enemy Resistance   3. Execute the Attack
                                            Request fire support
                                            Mass organic fires on
                                              objective
                                            Shift supporting fires
                                            Assault the objective
                                            Sweep the objective

4. Reorganize and Prepare   4. Consolidate on the Objec-
    to Continue the Attack   tive
                                            Establish local security
                                            Submit situation reports
                                              (SITREP)

B-18

UNIT: TANK COMPANY/TEAM

MISSION: DELAY

ARTEP   HUMRRO

TASK

1. **Prepare to Delay**   (6.1) Plan Mission Operation
                                             1. Conduct Troop Leading
                                                Procedures
                                                  Analyze mission
                                                  Issue warning order
                                                  Make estimate of situation
                                                  Make tentative plan
                                                  Issue operations order

                                             2. Conduct Terrain Analysis
                                                  Plan the reconnaissance
                                                  Conduct local reconnaissance

                                             3. Conduct Coordination
                                                  Coordinate with higher units
                                                  Coordinate with adjacent
                                                    units
                                                  Coordinate with attached
                                                    elements

2. **Organize Initial Delay**   2. Organize Initial Delay Position
   Position & Select   1. Occupy Initial Delay
                                                Position
                                                  Establish primary delay
                                                    position
                                                  Establish alternate delay
                                                    position
                                                  Establish supplementary
                                                    delay position
                                                  Establish blocking position(s)

                                             2. Prepare Fighting Positions
                                                  Establish cover
                                                  Establish concealment
                                                  Establish observation and
                                                    fields of fire
                                                  Mark routes between fighting
                                                    positions

ARTEP   HUMRRO

TASK

                                    3. Provide Surveillance &
                                       Security
                                         Establish OPs/LPs[1]
                                         Establish dismounted
                                           sentries
                                         Establish mounted sentries
                                         Maintain light-noise-
                                           movement discipline
                                         Maintain listening silence
                                         Emplace trip flares[1]

                                    4. Prepare Obstacles
                                         Construct physical ob-
                                           stacles
                                         Emplace protective mine-
                                           fields[2]
                                         Emplace anti-personnel
                                           devices

3. Prepare Fire Plan   3. Organize Initial Delay Position
                                     1. Prepare Coordinated Fire
                                        Plan
                                          Select target areas covered
                                            by direct fire
                                          Select target areas covered
                                            by supporting fire
                                          Prepare coordinated fire
                                            plan for firing position

                                     2. Establish Alternate Wire
                                        Communications
                                          Establish wire communications

                                     3. Select Routes of Withdrawal

                                 4. Execute the Delay
                                     1. Engage enemy with long-range
                                          fires
                                          Request & adjust supporting
                                            fires
                                          Control distributions of
                                            direct fires

---

[1] Only for night engagements.

[2] Depends on support and materials available - allocated by TF
    commander.

B-20

ARTEP	HUMRRO

TASK

4. Conduct the Delay

4. Execute the Delay (Cont'd)

   2. Displace Company to the
      Rear[3]
      Execute disengagement of
        company elements
      Execute delay on successive
        positions
      Destroy supplies & equip-
        ment in danger of
        capture

5. Counter EW Activity

5. NOT INCLUDED

6. Organize Subsequent
   Delay Positions

6. Refer to Tasks #2 and #3

7. NOT STATED

7. Withdraw Through Friendly Forces
   1. Coordinate Passage of Lines
      Coordinate routes of with-
        drawal through friendly
        position
      Coordinate contact &
        passage
      Coordinate recognition
        signals
      Exchange enemy & friendly
        information
      Coordinate fire support
      Coordinate passage through
        obstacles
      Coordinate number of
        vehicles & identify last
        vehicle

   2. Execute Passage of Lines

8. Render Reports

8. NOT INCLUDED[4]

---

[3] Implied as part of mission.
[4] Included as part of "Conduct Sustaining Operations."

HUMRRO

9. **Conduct Sustaining Operations**

(8.1) Conduct Sustaining Operations

1. <u>Conduct Sustaining Operations</u>
   Maintain equipment
   Conduct resupply operations
   Feed personnel
   Reassign equipment
   Evacuate damaged equipment

2. <u>Conduct Administrative Operations</u>
   Reassign personnel
   Receive replacements
   Process prisoners of war

3. <u>Conduct Command and Control Procedures</u>
   Maintain communications
   Submit required reports
   Provide for succession of command

UNIT: TANK COMPANY/TEAM

MISSION: NIGHT TACTICAL ROAD MARCH

ARTEP   HUMRRO

TASK

1. Prepare for Road March   (6.1) Plan Mission Operations
                                    1. Conduct Troop Leading
                                        Procedures
                                         Analyze mission
                                         Issue warning order
                                         Make estimate of situation
                                         Make tentative plan
                                         Issue operations order

                                    2. Conduct Terrain Analysis
                                         Plan the reconnaissance
                                         Conduct local reconnaissance

                                    3. Conduct Coordination
                                         Coordinate with higher units
                                         Coordinate with adjacent
                                           units
                                         Coordinate with attached
                                           elements

                                    4. Identify Control Measures
                                         Identify control measures
                                           in offense
                                         Identify control measures
                                           in defense
                                         Identify control measures
                                           in delay

(2) NOT STATED   (2) Depart Assembly Area[1]
                                         Move out of assembly area

                                   (7.1) Conduct Tactical Road March
                                    1. Maintain March Discipline
                                         Cross start point
                                         Maintain rate of march
                                         Pass critical points
                                         Cross release point

_____

[1] Identified in HumRRO Mission 5.1 "Occupy and Depart Assembly
    Area."

TASK

2. Conduct Halts
        Conduct scheduled halts
        Conduct unscheduled halts
        Conduct refueling halts

3. Maintain March Security[2]
        Maintain surveillance
        Maintain listening silence
        Establish mounted sentries
        Adhere to control measures[3]

4. Conduct Sustaining   (8.1) Conduct Sustaining Operations
    Operations   1. Conduct Logistical Operations
                                          Maintain equipment
                                          Conduct resupply operations
                                          Feed personnel
                                          Reassign equipment
                                          Evacuate damaged equipment

                                      2. Conduct Administrative
                                          Operations
                                            Reassign personnel
                                            Receive replacements
                                            Process prisoners of war

                                      3. Conduct Command and Control
                                          Procedures
                                            Maintain communications
                                            Submit required reports
                                            Provide for succession of
                                               command

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[2] Omitted from mission but identified in other missions.

[3] Accomplished throughout mission as required; i.e., when crossing
SP, CP and RP.

UNIT: TANK COMPANY/TEAM

MISSION: DAYLIGHT ATTACK AND EXPLOITATION

ARTEP	HUMRRO

TASK

1. Prepare to Attack	(6.1) Plan Mission Operation
	1. Conduct Troop Leading Procedures
	Analyze mission
	Issue warning order
	Make estimate of situation
	Make tentative plan
	Complete operations plan
	Issue operations order
	2. Conduct Terrain Analysis
	Plan the reconnaissance
	Conduct local reconnaissance
	3. Conduct Coordination
	Coordinate with higher units
	Coordinate with adjacent units
	Coordinate with attached elements
	4. Identify Control Measures
	Identify control measures in offense
	Identify control measures in defense
	Identify control measures in delay
(2) NOT INCLUDED	(2) Move Into Attack Position
	Deploy into attach position
	Exchange information with local CO
(3) NOT INCLUDED	(3) Execute Passage of Lines
	Tranfer responsibility with local CO
	Conduct passage through friendly troops

B-25

ARTEP	HUMRRO

TASK

2. Use Supporting Fires to Prepare Objective

    2. <u>Execute the Attack</u>
       Request fire support

3. Use Air Defense Weapons to Provide Defense From Enemy Air Threat

    3. NOT INCLUDED

4. Conduct Attack

    4. <u>Execute the Attack</u>
       Cross line of departure
       Maintain attack formation
       Maintain surveillance
       Adhere to control measures
       Mass organic fires on
         objective
       Shift supporting fires
       Assault the objective
       Sweep the objective

       <u>Consolidate on the Objectives</u>
       Establish local security
       Submit situation report
         (SITREP)

5. NOT STATED

    5. <u>Execute the Attack</u>
       Request fire support
       Maintain attack formation
       Maintain surveillance
       Adhere to control measures
       Mass organic fires on
         objective
       Shift supporting fires
       Assault the objective

6. Conduct Sustaining Operations

    (8.1) Conduct Sustaining Operations
       1. <u>Conduct Logistical Operations</u>
         Maintain equipment
         Conduct resupply operations
         Feed personnel
         Reassign equipment
         Evacuate damaged equipment

       2. <u>Conduct Administrative Operations</u>
         Reassign personnel
         Receive replacements
         Process prisoners of war

6. Conduct Sustaining   (8.1) Conduct Sustaining Operations
   Operations   (Cont'd)

                                  3. Conduct Command & Control
                                     Procedures
                                       Maintain communications
                                       Submit required reports
                                       Provide for succession of
                                         command

UNIT: TANK COMPANY/TEAM

MISSION: DEFENSE

ARTEP   HUMRRO

TASK

(1) NOT STATED   (8.1) Plan Mission Operation
                                              1. Conduct Troop Leading
                                                 Procedures
                                                  Analyze mission
                                                  Issue warning order
                                                  Make estimate of situation
                                                  Make tentative plan
                                                  Complete operations plan
                                                  Issue operations order

1. Occupy the Defensive   1. Occupy Assigned Sector of
   Position   Defense

                                          Establish primary defensive
                                            position
                                          Establish alternate
                                            defensive position
                                          Establish supplementary
                                            defensive position
                                          Establish blocking position

2. Prepare Defensive   2. Provide Surveillance & Security
   Positions   Establish OPs/LPs[1]
                                         Establish dismounted sentries
                                         Establish mounted sentries
                                         Maintain light-noise-movement
                                           discipline
                                         Maintain listening silence
                                         Emplace trip flares[1]

                                         Prepare Fighting Positions
                                          Establish cover
                                          Establish concealment
                                          Establish observation and
                                            fields of fire
                                          Mark routes between fighting
                                            positions

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[1] May not be required during Daylight Operation

B-28

	ARTEP		HUMRRO

TASK

2.	Prepare Defensive Positions (Cont'd)	2.	Prepare Obstacles
			  Construct physical obstacles
			  Emplace protective mine-
			    fields
			  Emplace anti-personnel
			    devices

3.	Prepare a Company/ Team Fire Plan	3.	Prepare Coordinated Fire Plan
			  Select target areas covered
			    by direct fire
			  Select target areas covered
			    by supporting fire
			  Prepare fire plan for primary
			    position

4.	Conduct Counterattack (Reserve Company/Team)	(2.1)
		4.
			Conduct Coordinated Attack[2]
			Execute the Attack
			  Cross line of departure
			  Request fire support
			  Maintain attack formation
			  Maintain surveillance
			  Adhere to control measures
			  Mass organic fires on
			    objective
			  Shift supporting fires
			  Assault the objective
			  Sweep the objective

5.	Conduct Sustaining Operations	(8.1)
		1.
			Conduct Sustaining Operations
			Conduct Logistical Operations
			  Maintain equipment
			  Conduct resupply operations
			  Feed personnel
			  Reassign equipment
			  Evacuate damaged equipment

		2.	Conduct Administrative Operations
			  Reassign personnel
			  Receive replacements
			  Process prisoners of war

---

[2] Used to evaluate reserve company/team only.

[3] Refers to company/team given the Mission to Defend.

ARTEP   HUMRRO

<u>TASK</u>

5. Conduct Sustaining   3. <u>Conduct Command & Control</u>
    Operations (Cont'd)   Maintain communications
                                        Submit required reports
                                        Provide for succession of
                                        command

B-30

UNIT: TANK COMPANY/TEAM

MISSION: NIGHT OCCUPATION OF ASSEMBLY AREA

ARTEP   HUMRRO

TASK

1. Occupy Assembly Area   (6.1) Plan Mission Operation
                                    1. Conduct Troop Leading
                                        Procedures
                                          Analyze mission
                                          Issue warning order
                                          Make estimate of situation
                                          Make tentative plan
                                          Complete operations plan
                                          Issue operations order

                                    2. Conduct Terrain Analysis
                                          Plan the reconnaissance
                                          Conduct local reconnaissance

                                    3. Conduct Coordination
                                          Coordinate with higher units
                                          Coordinate with adjacent
                                            units
                                          Coordinate with attached
                                            elements

                                    4. Identify Control Measures
                                          Identify control measures in
                                            offense
                                          Identify control measures in
                                            defense
                                          Identify control measures in
                                            delay

2. NOT STATED   2. Maintain March Discipline[1]
                                          Cross start point (SP)
                                          Maintain rate of march
                                          Pass critical points (CPs)
                                          Cross release point (RP)

3. NOT STATED   3. Occupy Assembly Area
                                          Establish local area

---

[1] Implied from Primary Training and Evaluation Standards in ARTEP.

B-31

ARTEP	HUMRRO

TASK

4. NOT STATED

                                        4. Provide Surveillance and
   Security
     Establish OPs/LPs
     Establish dismounted sentries
     Establish mounted sentries
     Establish light-noise-
       movement discipline
     Maintain listening silence
     Emplace trip flares
     Establish concealment

5. NOT STATED

                                          5. Prepare Fighting Positions[2]
     Establish cover
     Establish concealment
     Establish observation and
       fields of fire
     Mark routes between fighting
       positions

6. NOT STATED

                                          6. Prepare Obstacles
     Construct physical obstacles
     Emplace protective minefields
     Emplace anti-personnel devices

7. NOT STATED

                                        7. Prepare Coordinated Fire Plan[2]
     Select target areas covered by
       direct fire
     Select target areas covered by
       supporting fire
     Prepare fire plan for primary
       position

8. Camouflage

                                        8. INCLUDED IN ABOVE[3]

9. Conduct Sustaining
Operations

                                 (8.1) Conduct Sustaining Operations
         .1. Conduct Logistical Operations
             Maintain equipment
             Conduct resupply operations
             Feed personnel
             Reassign equipment
             Evacuate damaged equipment

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[2] Tasks included in HumRRO's Defend Mission.

[3] Included in Task "Establish Concealment".

ARTEP	HUMRRO

TASK

(8.1) Conduct Sustaining Operations
(Cont'd)

2. Conduct Administrative
Operations
Reassign personnel
Receive replacements
Process prisoners of war

3. Conduct Command & Control
Procedures
Maintain communications
Submit required reports
Provide for succession of
command

10. Perform Organizational   10. INCLUDED IN ABOVE
Maintenance

11. Perform Recovery/   11. INCLUDED IN ABOVE
Evacuation

UNIT: TANK PLATOON

MISSION: ADVANCE TO CONTACT

<u>ARTEP</u>   <u>HUMRRO</u>

<u>TASK</u>

1. **Prepare to Advance**   (6.1) Plan Mission Operation
                                                1.   <u>Conduct Troop Leading</u>
                                                    <u>Procedures</u>
                                                    Analyze mission
               Issue warning order
               Make estimate of situation
               Make tentative plan
               Complete operations plan
               Issue operations order

               2.   <u>Conduct Terrain Analysis</u>
               Plan the reconnaissance
               Conduct local reconnaissance

               3.   <u>Conduct Coordination</u>
               Coordinate with higher units
               Coordinate with adjacent
                 units
               Coordinate with attached
                 elements

               4.   <u>Identify Control Measures</u>
               Identify control measures in
                 offense
               Identify control measures in
                 defense
               Identify control measures in
                 delay

2. **Use Attack Position**   2.   <u>Move into Attack Position</u>
    (NA if attack position   Deploy into attack position
    is from present
    position)

3. **Cross Line of Departure**   3.   <u>Execute the Attack</u>
    (LD)   Cross line of departure

B-34

ARTEP	HUMRRO

TASK

4.	Move Prior to Contact	4.	**Execute the Attack**
			Maintain attack formations
			Maintain surveillance
			Adhere to control measures
5.	Action on Contact	(2.2)	Attack From March Column
		1.	**Take Action on Enemy Contact**
			Deploy into protective positions
			Submit situation report (SITREP)
			Establish protective fires
			Make estimate of situation
			Make tentative plan
			Complete operations plan
			Issue the order
		2.	**Execute the Attack**
			Mass fires on enemy position
			Mass organic fires
			Mass supporting fires
			Maneuver attack force
			Maintain attack formation
			Maintain surveillance
			Assault the objective
			Shift fires
			Sweep objective
6.	Secure the Objective	6.	INCLUDED IN ABOVE
7.	Render Reports	7.	INCLUDED IN BELOW
8.	Consolidate and Reorganize on the Objective	8.	**Consolidate on Objective**
			Establish local security
			Submit situation report (SITREP)
9.	Conduct Sustaining Operations	(8.1)	Conduct Sustaining Operations
		1.	**Conduct Logistical Operations**
			Maintain equipment
			Conduct resupply operations
			Feed personnel
			Reassign equipment
			Evacuate damaged equipment

ARTEP   HUMRRO

TASK   (8.1) Conduct Sustaining Operations
                                              (Cont'd)

                                          2. Conduct Administrative
                                              Operations
                                                Reassign personnel
                                                Receive replacements
                                                Process prisoners of war

                                          3. Conduct Command & Control
                                              Procedures
                                                Maintain communications
                                                Submit required reports
                                                Provide for succession of
                                                  command